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$\left[\begin{array}{c}\$ 3 \text { per A nnumm } \\ {[\text { IN ADVANCE. }]}\end{array}\right.$

## THE TYPE WRITER.

In the month of July, 1867, we published an article de scribing a type writing machine, invented by a Mr. Pratt, of Alabama, which had then just been placed on exhibition in England. Referring to the subject of writing by mechanical means, we stated that " thithanitest fessibility and advantage indicate that the laborions and unsatisfactory performance $f$ the pen must sooner or later become obsolete for general p," urpose, ature would find before him a wide field and large demand for his invention

It seems that the seed hus scattered broadcas through our columns has, in this instance, fallen upon fertile soil, for its ruit is now before us in the shape of a reafly prac ical typographer, accom panied by a letter from the inventor to the effect hat his inspiration wa erived from the ides ad erived in these column nd that he condid ane to our entiders to ue to our enterprise to cy of our labors.
The difficulty which veryone, heretofore at tempting to construct ap paratus of this nature, bas encountered has been so o govern the types mak ing the impressions on the heet that the character hould follow each othe n even lines and at prope intervals, in the same man ner as the letters on printed page. The inge ious manner in which his problem has bee solved is shown in Fig. 2 which is a sectional view omprising the ortion of the desice is a lever or key from which a wire leads to the short arm of one of the ype levers, B. These type levars, at the lower ends of which, C, the types are at tached, are arranged in circle, a section of which is shown in the engraving, o that when they are at rest they form a sortof pot, shaped like the frustum
and is made to move bodily in the direction of its length by means of a weight.
We will now suppose that the operator begins to write. As she presses a key, it not only causes a type to fly up and leave its imprint on the paper, but, at the same time, it moves a ock shaft and dog, which, acting on a rack, permits the cylnder to be drawn, by the falling weight, a space equal to the ing finished, the longer interval between it and the one fol lowing is obtained by pressing down the square frame ex-


SHOLES TYPE WRITER.
a ratchet wheel on the side of the cylinder, causes the latter to rotate on its own axis a sufficient distance to place the paper, which rests on its surface, in a position to receive he impression of another line.
By means of other ingenious attachments, which we have not room to describe, the spaces between letters, words, or parallel lines can be altered at pleasure. Words or sen ences may be underscored whenever it is required to do so The instrument permits two or more copies to be taken a once, as in manifold writing
It requires no especial skill in its manipulation. child knowing its letters may use it after an hour's instruction, and indeed any one, after short practice can easily become able to write from sixty to eighty words per minute. The motion of the hand is free easy, and unconstrained, so that the monotonous move ment of the pen is avoided and the labor of writing performed with far less fatigue to the muscles of the hand and arm. The resistance of the keys to the fingers is not more tha from four to five ounces the same as that of the keys of a piano whil their movement und hand is about under the hand is about five six. enths of an inch.
The advantages gained by substituting plain letter press for manuscript are necessarily very important. It is well known that, notwithstanding the practice of a life time, barely a the of ordinary manu. cript is universally legi. ble, while an almost incal. culable amount of time is wasted in telegraph, post printing, and law officesin ripa eciphering obscure handwriting. To authors who re but slow penwen, the rapidity with which their deas can be put in permanent form by this machine will prove of the greatest askistance. Others, whose penmanship is of the Greeley order, an undistinguishable mass of bieroglyphics, will have che satisfaction of produing manuscript that can be read, while the work be read, while the work a cone. D is an inked ribbon passing over rollers and the figure in our engraving is represented as resting. As of both amanuensis and printer can extending between the paper rolled on the cylinder, E, and soon as the cylinder has traveled the length of a line, it strikes and at the same time.
the type. A pressure on the knob of the lever, A, pulls down a bell, thus notifying the operator of the fact. By pressing The instrument in its present practical form, was pate the wire, which, drawing down the short arm of one of the type levers, causes the end of the corresponding long arm to rise up and strike against the ribbon, thus leaving the impression of the type on the paper. As these levers are arranged in a circle, and their long arms made equal to the radius of the same, it is evident that the type ends of all will strike exactly at the center, so that if a piece of paper be immovably held directly over that point, the entire alphabet, punctuation marks, etc., may be printed one letter over another on precisely the same spot.
The remainder of the instrument consists of various ingenious devices for moving the paper so that the characters may be printed in proper succession. Referring to Fig. 1, the operator is seen sitting before a keyboard or assemblage of knobs, each of which is marked with a letter or punctuation mark, and each attached to one of the levers represented by A in Fig. 1. The paper is placed sented by A in Fig. 1. The paper is placed 2), situated on the (Eig. of the machine the top of the box inclosing the lower portions

 of the machine. This cylinder rests in a frame on wheels, own the treadle under the machine, the cylinder is drawn ck to |  |  |
| :--- | :--- |
| back to its starting point, the weight raised ready to descend | halls, lighthouses, etc., for which it is well adapted; and we |
| again, and at the same time a lever is moved which, acting |  |$| \begin{aligned} & \text { shall, no doubt, soon hear of new applications of the invention }\end{aligned}$

## glacial action in south america.

From Professor Agassiz's late report from the Hassler expedition to the Superintendent of the Coast Survey, we learn that his attention has been specially occupied with the glacia phenomena of the regions explored, and that his di
His observations, which extended along the coast of South His observations, which extended along the coast of South
America from Monte Video on the Atlantic side to Talcahuano on the Pacific coast, were more particularly directed to the on the Pacific coast, were more particularly directed to the
situation and distribution of erratic pebbles and boulders, situation and distribution of erratic pebbles and boulders,
with the view of determining the agency by which they have with the view of determining the agency by which they have
been transported to their present resting places. It will be been transported to their present resting places. It will be
impossible in this article to follow our author step by step through all the very interesting details of his investigations but, remarking that they have been most thoroughly pursued throughout, we will endeavor to give a brief general idea of heir nature and results.
All over eastern Patagonia, including a portion of the straits of Magellan, are horizontal beds of tertiary formation which rise one above another. In consequence of disintegra tion, the harder beds form retreating shelves, like stairs, upo taken place, these shelves give rise to terraces which stretch horizontally, at various hights all over the plains. The up per part of a cliff, situate at Cliff End in San Mathias Bay which has not suffered denudation, was found to consist chiefly of sandy clay, with which alternate two distinct horizonta beds of considerable thickness formed entirely of pebbles.
It is noteworthy that while these pebbles alternate thus in regular stratification in the upper part, they also form super ficial deposits on the shelves below; and the Professor think that similar superficial deposits on such shelves elsewhere may have been mistaken by Darwin in some cases for indica tions of successive upheavals of the land. Here he sees no evidence of any upheaval, except one, which has taken place since the deposition of the tertiaries, and while shells found therein (now living) already existed; and still less does it ap pear to him that the country was submerged during the transposition of the erratics found here. Towards the west end of the bay, at San Antonio, where extensive denudations have taken place in the very formation just described, similar peb bles occur again; but, instead of being in well defined beds bove the sea level, they exist as shore pebbles, which cover in a deep layer, the entire beach. Their position here shows beyond doubt, that the set of beds above which they rest a Cliff End has been broken down and recently removed by the action of the sea, and the pebbles themselves thus brought down to the beach. It follows from this that they could no have been ground to their present shape upon the modern beach, but that they must have undergone that process upon an older foundation which corresponded at the time to the level of their beds at Cliff Ead.
From these facts, and from subsequent observations rela tive thereto made further south, the inference is drawn tha these pebbles must have passed through the mill of a glacier' bottom before they were worked up by the floods into their present position; and there is no reason why the floods which denuded the shelves could not as well have been caused by melted ice at the close of the gl
In Possession Bay, in the Straits of Magellan, was found bout a mile from the shore bluff and nearly 150 feet above the sea level, a salt pool, in which marine shells identical with those now living along the shore were abundant. They were perfectly preserved and many of them were alive. In
this was evidence of a very recent upheaval, and a confirmathis was evidence of a very recent upheaval, and a confirma-
tion of Darwin's assertions of recent occurrences of a like nation of Darwin's assertions of $\mathrm{r} \epsilon$ cent occurrences of a like na
ture on this shore. Upon further exploration, upon a tertiar errace a little above the salt pool was found a distinc moraine (that is, a ridge of boulder-shaped stones alway found at the foot of a glacier) in which scratched pebbles were mingled with rounded ones in as large a proportion a occurs in any moraine found fronting an existing glacier Higher up, also, erratics were scattered over the plain, and at the highest elevation, 400 feet above tide water, a number of large, angular boulders were seen. The existence of this pool and moraine, in clos $\theta$ proximity, is considered a fact of reat significance. That no gradual upheaval has occurred is proved by the ground, which consists of tertiary beds with ut a trace of shore pebbles. Darwin was led to believe that he drift was scattered over Patagonia by icebergs while the country was submerged; but the presence here of this mo aine shows that the upheaval must have occurred before the dispersion of the drift, and not after.
Many and almost exact similarities were remarked between the Patagonia and Alpine scenery, and the surface features of the straits were found to have much the same aspect as the glaciated surfaces of the northern hemisphere, while from the higher mountains of the Andes glaciers were seen, depending to the sea level, which may fairly be compared with the most impressive glaciers of the Alps. In many places the glacial mariss were as plain as in the valleys of Switzer mistakable. The absion by ice waiform, general and un been from the south, norchward; and the direction is such that glaciers from the adjoining mountains cannot be supposed to have caused the abrasions and furrows of the rocks All the erratic stones found in the entire survey possess the ame character, and their geological identity is further show by the presence of a certain very hard, compact rock which is never absent from them, and yet never found in place, so
far as known, over the whole extent of country examined. far as known, over the whole extent of country examined. anlargement of the existing glaciers, as in that case the drift ould consint mainly of the rocks in place and would differ ac
cording to locality. This distinctive nature of the drift lod our author from the first to discriminate between the phenomena connected with the local glaciers and those belonging to what be designates the glacial period. To this period he refers a great part of the phenomena witnessed by him, and which he looks upon as palpable evidence that a prodigious mantle of ice was once spread over the southern part of this ontinent; and he further believes that future investigation will bring to light conclusive evidence of a southern circumpolar glacial agency.

Recent Astronomical Discoveries.
Dr. Huggins has communicated to the Royal Society a series of results of extreme interest, obtained by means of $t$
fine telescope placed at his disposal by the Royal Society.
His work, according to the Mechanics' Magazine, has be ivided into two main portions. First, he has been engaged in comparing one of the bright spectral lines of the gaseous nebulæ with the corresponding line in the spectrum of nitroen. This line, as seen in the latter spectrum, is double When using his own 8 inch telescope, Dr. Huggins was una le to determine whether the nebula line was double or not He could not use sufficient dispersive power. He has now obtained definite results on this point, so far at least as the Orion nebula is concerned. In the spectrum of nitrogen, the components of this double line are rather broad and nebulous. In the'spectrum of the Orion nebula, there is one line, arrow and well defined, which agrees in position with the less refrangible of the nitrogen pair
It is possible, however, Dr. Huggins remarks, that this ine in the spectrum of the gaseous nebulæ is not due to ni trogen at all; or else, one line of nitrogen fades out alto gether.
The second series of results obtained by Dr. Huggins is more definite and important. It relates to the determina tion of the stellar motions of recession or approach
Dr. Huggins had judged, when he used his 8 inch telescope, hat Sirius is receding at the rate of about 25 miles per sec nd. He now finds, with a telescope fifteen feet long, that the rate of recession is somewhat less, lying probably between 8 and 22 miles per second
He has now been able to extend this method to severa ther stars. He finds evidence in favor of a general tenden y to recession in stars occupying that part of the heavens from which our sun is known to be traveling; while on the pposite side of the heavens the stars seem in general to be pproaching. But the rates of recession and approach a ord very ill with the usually adopted value of the sola poper motion, and appear to support the theory recently a anced, that , and appear to support the theory, recently ad that value has been based, are not trustworthy. We kno hat the sun's rate of motion has been set at five or six mile per second, and such a rate of motion could only account for general excess of recession in stars lying ia one direction, and of approach in stars lying in the opposite, by about the ame amount. But Dr. Huggins finds motions of recession f from 15 to 40 miles per second, and motions of aporoach amounting even to the enormous rate of nearly 50 miles pe econd, in the case of Arcturus. It follows from this that Struve's estimate of the average distances of the brighto tars is altogether too low.
But even more interesting than this result, is Dr. Hug ins's recognition of a community of motion in certain sets f stars.
It was to precisely such community of motion that Mr Proctor invited attention in the paper on star drift, read be ore the Royal Society on January 20, 1870; and he expressed hen, and has since repeatedly expressed, his conviction tha whenever Dr. Huggins applied to certain stars the spectro scopic method of determining motions of recession or ap proach, he would find that they are either all receding or al pproaching, and at the sam $\forall$ rate.
This prediction has been fulfilled to the letter. Dr. Hug gins finds that these stars
It is evident that Dr. Huggins' method of research prom ises results of exceeding interest and throwing a new light n the structure of the sidereal universe. He has now placed beyond question what Mr. Proctor has long main ained-the theory, namely, that within the stellar system here exist subordinate systems, surrounded by regions rela ively barren. These systems of stars speed on their course ossessing a community of motion within the great star sys em, though within these subordinate systems themselve very varioty of motion may subsist. It is wonderful, in eed, to consider the consequences which flow from this dis overy. The whole aspect of the sidereal universe is changed by it. All theories which have so long done ser vice in our text books of astronomy go by the board. W see that there is a complexity of detail within the stellar uni verse and a variety of aggregation, of structure, of motion, of interdependence, and finally, an exuberance of vitality, suc s until the last two or three years had not been recognized by astronomers.

Compressed Gun Cotton.
Great benefits in point of economy and efficiency are derived from the new aystem of reducing the gun cotton fiber to pulp, and converting it by powerful compression into compact ho mogeneous masses. Important consequences of the large $r$ uction in the space occupied by gun cotton, when used in this compressed form, were the very considerable increase in
the amount of tamping which could be used in blast holes, and the greater concentration of the force applied; the de structive effects in hard rock were consequently much aug
mented, and the cool
and reduced in dimensions. Large charges of compressed gun cotton occupied so much less space than the rope charges, and were so considerably lighter than powder charges, that the material became specially valuable for submarine operations. Other peculiar advantages were presented by the compressed material; thus, its cost of production was greatly reduced, because cotton waste could be employed in its manufacture, and because its conversion into the required forms required comparatively little time: its purification was more complete, as the finely divided fiber was much more readily washed than the long fiber required for furnishing rope washed than the long fiber required for furnishing rope
charges; and its uniformity was much greater, because the charges; and its uniformity was much greater, because the products of a large number of successive small operations
were intimately blended together in the pulping and washing were intim
processes.
When carried into the field for military purposes, compressed gun cotton is very decidedly safer than nitro-glycerin preparations; because if carts or packages containing the latter are fired into from accident or design with ordinary small arm bullets, their contents will be violently exploded as by detonation, while the gun cotton under the same circumstances would be simply inflamed.
Although gun cotton and nitro-glycerin mixtures possess very important advantages over gunpowder, in all applications where suddenness and violence of action are desirable, there are some directions in which they do not possess superiority over powder, and others in which they cannot replace it, irrespectively of its applications to projectile purposes. In soft rock, in earth mines, and in some blasting operations, where $t$ is desired to displace large masses of earth, rock, or stone, he gradual action of gunpowder gives it decided superiority. The degree of safety with which explosive agents may be manufactured is an important question connected with their extensive application. The fact that the manufacture of gun cotton as now carried on involves not the slightest risk of explosion up to the final stage, when the material has to be dried, distinguishes it from most other explosive agents. n gunpowder manufacture, liability to explosion exists hroughout all operations from the point when the ingredients are mixed, and with regard to nitro-glycerin it appears hat up to the present time occasional severe accidents during manufacture have been inevitable. The immunity enjoyed by gun cotton is due to its being wet, and therefore absolutely uninflammable, throughout all stages, even after it has been compressed into cakes or disks. At this point it contains 15 per cent of water, the expulsion of which by desiccation is unattended by any liability to explosion, or even to ignition f very simple precautions are adepted. For storing large quantities with absolute safety, it ${ }^{\text {a }}$ very convenient to preserve the compressed gun cotton damp, as it is delivered from the presses. It has been thus stored for very long periods without the slightest detriment, and its non-inflammability in this condition is aptly illustrated by the fact that the perfo rations required in some of the charges are produced by drill ing the damp gun cotton, the drill revolving at the rate of about 600 revolutions per minute. The gun cotton employed in some extensive experiments recently made had been stored damp for nearly nine months, and was dried partly in the pen air and partly in a hot air chamber, when required for use. On that occasion, says the Mechanics' Magazine, six cwt. of damp gun cotton, packed in 24 strong wooden boxes, were stacked in a wooden shed and surrounded by inflammable material. The building was then fired, and soon burned fiercely, which it continued to do for about half an hour, when the fire gradually subsided, and the building and its content were entirely consumed. The gun cotton must have slowl burned a way as the surfaces of the masses became sufficientl ry, but at no period of the experiment was there even an burst of flame, due to rapid ignition, perceptible.

## Narrow Gage in Japan

After three years' labor, the Japanese have succeeded in building one railroad for a distance of thirteen miles. The line was intended to connect Yokohama and Jeddo, these cities being seventeen and a half miles apart; but public ravel has
The road has but a single track of three feet six inche gage, and yet has cost nearly $\$ 120,000$ per mile. Unless, as s most probably the case, there is an immense lack of en ineering talent in the country, it is difficult to find an ex planation for this state of facts. Labor is abundant and heap; money and material are plentiful, and the construc ion of the line has been retarded by no physical difficulties The correspondent of the New York Herald states tha ven the completed portion of the route is but poorly built notwithstanding its great cost. There are first, second, and third class cars. Those of the lowest class look like diminu tive cattle cars with wooden benches in them, while those of the other classes resemble ordinary street cars, only they are narrower and in every way smaller. The first class cars are divided into three compartments by sliding doors, and carry twelve persons comfortably. The second class cars differ from the first by not being subdivided, and by being fur nished with cane seats instead of leather ones.
The highest speed attained is about twenty-two miles per hour. Officials abound, there being two to each car. The oad, in spite of all its shortcomings, is rapidly makin ooney, having averaged since its opening some $\$ 500$ pe day. The rates of fare are absurdly high (1st class, $\$ 1.50$
2 d class, $\$ 1$; 3d class, 50 cents); but these, it is stated, will soon be reduced.

THe great bridge across the Mississippi at St. Louis, Mo is almost done. It is to be finished during the present month of August.

## THE ANNUAL AUGUST SHOWER OF METEORS

It is now generally received and placed almost beyond doubt, by the recent observations of Schiaparelli, Le Verritr Weiss, and others, that meteors, for the most part small but eighing occasionally many tuns, are fragmentary masses evolving, like the plenets, round the sun, which in thei course approach the earth, and, drawn by its attraction int our atmosphere, are set on fire by the heat generated throug the resistance offered by the compressed air.
Their chief constituent is metallic iron, mixed with various silicious compounds; in combination with iron, nickel is al ways found, and sometimes also cobalt, copper, tin, and chro mium.
The hight at which meteors appear is very various, and ranges chiefly between the limits of 46 and 92 miles; the mean may be taken at 66 miles. The speed at which they travel is also various, generally about half as fast again as that of the earth's motion round the sun, or about 26 miles in a second; the maximum and minimum differ greatly from this amount, the velocity of some meteors being estimated at 14 miles, and that of others at 107 miles in a second.


When a dark meteorite of this kind, having a velocity of 1,660 miles per minute, encounters the earth,'flying through space at a mean rate of 1,140 miles per minute, and when hrough the earth's attraction its veloci meets with such degree of resistance, even in the highest and most rarefied state of our atmosphere, that it is impeded in its course, and loses in a very short time a considerable part of its momen tum. By this encounter there follows a phenomenon, which always takes place when the motion of a body is interrupted designated by the expression "the conversion of the motion of the mass into molecular action or heat;" it is a law with out exception that, where the external motion of the mass is diminished, an inner action among its particles, or heat, is set up in its place as an equivalent, and it may be easily sup posed that, even in the highest and most rarefied strata of the farth's atmosphere, the velocity of the meteorite would be rapidly diminished by its opposing action, so that shortly af ter entering our atmosphere the vibration of the inner partic es would become accelerated to such a degree as to raise them to a white heat, when they would either become par tially fused, or, if the meteorite were sufficiently small, it would be dissipated into vapor, and leave a luminous track behind it of glowing vapors.
As this heat originates form the motion of the meteor being impeded or interrupted by the resistance of the air, and as this motion or momentum is exclusively dependent on the speed of the meteor as well as upon its mass, it is possible hen the rate of motion has been ascertained by di vation, to determine the mass. Professor Alexander Hersche as calculated by this means that those meteors of the 9 th and 10th of August, 1863, which equaled the brilliancy o Venus and Jupiter, must, have possessed a mass of from five to eight pounds, while those which were only as bright as stars of the second or third magnitude would not be more than about ninety grains in weight. As the greater number of meteors are less bright than stars of the second magnitude he faint meteors must weigh ouly a few grains, for, according to Professor Herschel's computation, the five meteors ob served on the 12th of November, 1865, some of which sur passed in brilliancy stars of the first magnitude, had not an average weight of more than five grains; and Schiaparelli estimated, from other phenomena, the weight of a meteor to be about fifteen grains. The mass, however, of the meteoric stones which fall to the earth is considerably greater, whethe they consist of one single piece, such as the celebrated iron stone discovered by Pallas in Siberia, which weighed abou 2,000 pounds, or of a cloud composed of many small bodie which enter the earth's atmosphere in parallel paths, as shown in the engraving and which, from a simultaneousignition and
descent upon the earth, present the appearance of a large meteor bursting into se veral smaller pieces. Such a showe of stones, accompanied by a bright light and loud explosion, occurred at L'Aigle, in Normandy, on the 26th of April, 1803, when the number of stones found in a space of 14 square Kúyahinged 2,000. In the cipal stone weighed about 800 pounds, and was accompanied by about a thousand smaller stones, which were strewn over n area of 9 miles in length by $3 \frac{1}{4}$ broad.
The meteor shower of the 10th of August, the radiant point f which is situated in the constellation Perseus takes place early every year, with varying splendor; we may therefore conclude that the small meteors composing this group form a ring round the sun, and the earth every 10th of August i at the spot where this ring intersects our orbit, also that the ring of meteors is not equally dense in all parts; here and
there these small bodies must be very thinly scattered, and there these small bodies must be very the
in some places even altogether wânting.
The diagram shows a very small part of the elliptic orbit which this meteoric mass describes round the sun, S. The earth encounters this orbit on the 10th of August, and goes straight through the ring of meteors which $i_{\S}$ nite in our at mosphere, and are visible as shooting stars. The line, $m$, is the line of intersection of the earth's orbit and that of the meteors; the line, P S, shows the ditection of the major axis of their orbit.- This axis is fifty times greater than the mean ameter of the earth's orbit; the orbit of the meteors is in clined to that of the earth at an angle of 643 , and
motion is retrograde, or contrary to that of the earth.
the retrograde, or contrary to that of the earth.
The on the 12th or 13 th of that month, but it is fue every every 32 years an extraordinary shower occurs on those days, proceeding from a point in the constellation Leo. The meteors composing this shower, unlike the August one, are
not distributed along the whole course of their orbit, so as not distributed along the whole course of their orbit, so as to form a ring entirely filled with meteoric particles, but con stitute a dense cloud, of an elongated form, which complete its revolution round the sun in 33 years, and crosses th earth's path at that point where the earth is every 13 th of November.
Schiaparelli shows in a striking manner that, as a comet is independent motion, the head or nucles, each possessing an must necessarily complete its orbit in less time than the more distant portions of the tail. The tail will therefore lag behind the nucleus in the course of the comet's revolution, and the comet, being more and more elongated, will at last e either partially or entirely resolved into a ring of meteors. In this way the whole path of the comet becomes strewn
with portions of its mass, with those small, dark, meteoric with portions of its mass, with those small, dark, meteoric
bodies which, when penetrating the earth's atmosphere, bebodies which, when penetrating the earth's
come luminous, and appear as falling stars.
Schiaparelli has, in fact, discovered so close a resemblanc between the path of the August meteors and that of the comet of 1863 , No. III, that there cannot be any doubt as to their complete identity. The meteors to which we owe the annual display of falling stars on the 10th of August are not distributed equally along the whole course of their orbit; it is still possible to distinguish the agglomeration, of meteoric particles which originally formed the cometary nucleus, from he other less dense parts of the comet; thus, in the year 862, the denser portion of this ring of meteors through which earth passes annually on the 10th of August, and which auses the display of falling stars, was seen in the form of met, with head and tail as the densest parts, approachin the sun and earth in the course of that month. The difference formed into a ring consists in that, while the denser mete ric mass forming the head approaches so near the earth nce in every 120 years as to be visible in the reflected light of the sun, the more widely scattered portion of the tail composing the ring remains invisible, even though the earth pass es through it annual'y on the 10th of August. Only frag ments of this ring, composed of dark meteoric particles, be come visible as shooting stars when they penetrate our at mosphere by the attraction of the earth, and ignite by the ompression of the air.
Calculation shows that this ring of meteors is about 10,948 millions of miles in its greatest diameter. As the meteoric hower of the 10th of August lasts about six hours, and the arth travels at the rate of eighteen miles in a second, it fo ows that the breadth of this ring, at the place where es it,
sis.

## Steam Power in Carriage Building.

In New York city, only four carriage factories employ steam power for running machinery; and we have good
reasons for believing that it pays the proprietors well-indeed so well that they would not dispense with it for man times the cost of the investment. Now, as it pays well in hese four factories, why would it not pay in all other large factories?
A ten horse engine, with boiler and the following most common machinery: a cross cut saw, a rip saw, a band saw a planer, a mortising machine, anda shaper, or variety mold ing machine, will cost, with shafts and belting, all up and ready for use, about $\$ 5,000$; and the daily expenses, includ ing fuel, engineer's wages, oil, etc., about $\$ 5$. Now, what benefit would be derived therefrom? Every wood worker spends, we have been told, about one eighth of his time daily by such sa wing as could be done by machine saws in less than ten minutes. By the shaping machine, it is but fair to estimate a similar saving of time; and the planer and
mortiser would, we think, average more. Where a dozen
mechanics are working, the said machinery will give a saving of three hours per man, or equal to three tenths of thei wages, in the aggregate about $\$ 15$ per day. We think tha the saving would be far greater under an efficient foreman, which the system requires, as he can systematize the work o that he gives each workman the materials after they have been cut, shaped, and dressed by the machinery, and aie nearly ready for connecting and finishing. If the foreman is unused to machinery, it will, of course, talke him some time to use it expeditiously; but if he is a smart man, which foreman always ought to be, he will soon master the difficulties: - Experience has taught us that it is best from the tart to hire a man used to run wood working machinery, as hereby a saving in time and expenses is immediately effect ; while in the absence of a skillful machine hand, the rection of machinery driven by steam power generally re ults in a loss of money and materials the first year.
Of course wood working machinery pays best where seve ral sets of work of the same shape are made. It needs no much penetration to understand that a dozen carriage bodie of one pattern can, by help of machinery, be made as cleap y as three bodies of different patterns. Nevertheless, we believe that, even in those shops where every carriage body has a shape of its own, wood working machinery will pay The sawa, for instance, are always handy assistants, no mat $r$ what work the maker is building.
In the smith shop, steam powsr is useful and labor-saving in a thousand ways. The old fashioned bellows may be dis carded, crip hammers erected, and almost one half of th ands dispensed with.
In the paint shop and varnish room, steam can always be used advantageously, as thereby a uniform temperature, so desirable for their work, may le maintained
Even in a trimming shop, steam power can be made avail ble, for moving machinery, for cutting leather, skin, buck ram, etc., and for driving sewing machines and other ma chinery. In fact, any establishment which has commenced o use steam power will soon learn that it is a general bene actor. The grindstones will al ways turn at a single move nent of the hand, superior glueing, bending and veneering pparatus are within command, and a general elevation is ways discernible where the steam engine is running. The onstant movement around the mechanic awakens his specu ative faculties. His mind will be turned in a direction that will gradually develop his mechanical ideas; and the result will be new mechanical devices, which will execute a certain mount of labor, stimulate him to greater achievements, and be a great use and benefit to him
All mechanics cannot be Watts, Fultons, Morses, or Howes but all should aim to be, and the more familiar they are with abor-saving machinery, the sooner will their latent genius come forth.-The Hub

## Use of Fruit

Instead of standing in fear of a generous consumption of ripe fruit, one should regard it as decidedly conducive to health. The very diseases, says the Country Gentleman, com monly assumed to have their origin in the free use of al kinds of berries, apples, peaches, cherries, pears, and melons have been quite as prevalent, if not equally destructive, in easons of scarcity. There are so many erroneous notion ntertained of the bad effect of fruit that it is quite time ounteracting impression should be promulgated, having it oundation in common sense and based on the common ob ervation of the intelligent. No one ever lived longer, o freer from the attacks of diseace, by dis carding the deliciou ruits of our country. On the contrary, they are very essen tial to the preservation of health, and are therefore given to us at the time when the condition of the body, operated up n by deteriorating causes not always comprehended, re uires their grateful, renovating influences. Unripe truit may cause illness, but fresh, ripe fruit is always healthful.

## New Photographic Method.

M. Fargier, whom the editor of the Moniteur tells us was the first to render carbon printing practicable, is again in the field with a new carbon process. Some specimens were ex hibited, and the following details communicated, at the last meeting of the French Photographic Society. The method eems to possess considerable novelty and interest. It is a follows
A certain saline solution, the nature of which is for the present a secret, is prepared and put into a dish. Upon thi bath a common sheet of paper is floated, then dried and ex posed to light under a negative. The image comes out by degrees, and you can watch its progress. When sufficiently rinted, this image is laid upon a bath of blackened gelatin ike that which is used for the preparation of pigment papers. The pigment only attaches itself to those parts which have been acted on by light. The paper is then washed in warn water, and the print is finished.

## Channel Railway Ferry

The Parliamentary Committee has rejected the bill author izing the construction of a new channel railway ferry between France and England. At present passengers are carried cross the English Channel, 29 miles, in
Mr. John Fowler,C. E., Engineer of the London Underground Railways, is the projector of the new channel ferry, and his cheme involves the employment of large steamers, 450 fee in length, on which the passenger cars are to be carried across A train of sixteen cars containing 336 passengers is to be carried, the cars being raised from and lowered to the decks fo the steamers by hydrauhio elevators.

## IMPROVED SEED CLEANER FOR THRASHERS.

The invention now illustrated is an improved apparatus for cleaning timothy and other grass seeds, which can readily be attached to the thrashers and separators in ordinary use. Our engraving shows the riddle and chain of rakes which compose the improvement, unattached to the machine The side boards of the riddle, $A$, are notched and made of shape suitable to fit on to the shoe of the thrasher, to which they are secured by screws or bolts. The riddle shown is provided with four screen plates, which are perforated so as to allow the blast to pass upward and the seeds downward to allow the blast to pass upward and the se
through the perforations. They are made through the perforations. They are made
with steps between them, the uprights of which are pierced with numerous holes, above which arepierced with numerous holes, above
which teeth are arranged so as to carry the which teeth are arranged so as to carry the
stalks, etc., on to the next plate and at the stalks, etc., on to the next plate and at the
same time allow the blast to operate upon same time allow the blast to operate upon
them properly as they are passing from one them properly as they are passing from one plate to the other. The carrier or stirrer, B,
consists of the endless belts shown, which consists of the endless belts shown, which pass round pulleys attached to shafts at the ends of its framework, and to which are attached toothed crossbars. The rear shaft revolves in bearings which are firmly connected with the frame of the thrasher in such a position as to bring the rear end of the carrier over the forward end of the last plete in the riddle. The forward shaft runs in adjustable bearings secured by screws, by means of which the tension in the belts is regulated. which the tension in the belts is regulated.
The carrier is driven by a belt connection The carrier is driven by a belt connection
with the operating mechanism of the straw with the operating mechanism of the straw
stacker. The teeth attached to the crossbars stacker. The teeth attached to the crossbars
are of sufficient length to reach nearly to the are of sufficient length to reach nearly to the
screw plates *of the riddle, and the belts and screw plates *of the riddle, and the belts and
teeth are arranged so that the sides of the riddle do not strike against them as the shoe of the thrasher is vibrated.
By the construction described, the motion communicated to the teeth of the carrier causes them to carry backward the chaff, stalks, etc., while they and the seed are being moved from side to side by the vibration of the shoe and riddle. The seed which falls through the three forward plates of the riddle passes down through the machine to the floor or grain box. That which passes through the rear plate is received by a spout and carried back to the thrasher.
The improvement is the invention of Mr. John L. Custer of Bonaparte, Van Buren Co., Iowa, from whom further in of Bonaparte, Van Buren Co., Iowa, from whom further in-
formation on the subject may be obtained. Patented through formation on the subject may be obtained. Patented ther
the Scientific American Patent Agency, May 14, 1872.

## A MUSICAL BAROMETER.

A very interesting and useful application of the electromotive force is seen in the musical barometer, invented by Captain Hans Busk, and patented in England. Within the case of an ordinary aneroid barometer, he arranges a series of

musical bells, of different tones, having hammers that are operated by electro magnetic agency, the magnets of the ham mers being brought into the battery circuit, and so made to strike, by means of the usual indicating pointer on the

face of the barometer. To eff oct this closing of the circuit the face of the barometer is provided with a series of platinum conducting pins, and whenever, by a change in the atmospheric conditions, the pointer is moved it touches a corresponding pin, and the bell that is in connection with such pin is sounded.
The general construction will be readily understood by a glance at our engravings, in which Fig. 1 shows the front of the barometer, and Fig. 2 the back thereof, exhibiting the
bells and their magnets. All the bells have a different bells and their magnets. All the bells have a different note. It is therefore easy to tell, even at a distance, whether the
barometer is rising or falling. The deeper toned bell gives notice when the barometer falls from 2950 inches down to 28, while the higher notes indicate a rise towards 31 inches is curious to note the rapidity with which these changes oc casionally succeed each other.

## Imported

Saliors
Sall we
It is a suggestive fact that the new American Steamship Company of Philadelphia think of going abroad for seamen Company of Philadelphia think of going abroad for seamen
t, and is, besides, a convenient addition to the writing desk. t can be made, if required, of sufficient size to contain tick or similar small articles. Address, for further informa ion, Mr. H. V. Dempster, 1,014 E street, Washington, D. C

## THE PATENT OFFICE GAZETTE.

The Official Gazette of the Patent Office is furnished at the government expense to Senators and Representatives in Congress; each of these persons may designate tight pubiic libraries to which the Gazette shall also be sent free. All others who desire to receive the publication must subscribe. The rate is to be not less than five dollars a year, which is the price at present. The Commissioner of Patents may, we presume, increase the price should he deem it necessary. The publication of the drawings of the patents for the current year on a reduced scale has been commenced in the Gazette. They are admirably executed by the American PhotoLithographic Company. The drawings are given in full, but such is the perfection of the reductions that, although the drawings of no less than thirty patents are in some cases pre. sented on a single page of the Gazette, every drawing is clear and legible.
The success of this excellent and economical mode of publishing the patent drawings, will, it is to be hoped, induce Congress to provide the means for the printing of the specifications in the same concise manner. If fine types are used, and care taken not to waste space in the margins, it will be practicable for the Government to issue printed copies of all the patents, occupying only eight or ten volumes a year, at a cost to subscribers of from ten to twenty dollars. This will be a work of great public importance and value. At present the draw-

## CUSTER'S SEED CLEANER FOR THRASHERS

can wages per month for seamen shows that, in the case of one of the new Philadelphia steamers, the annual difference
in wages in favor of a competing English steamer of the first class will amount to about $\$ 25,000$, or six per cent on the cost of construction. A first class English engineer gets, according to the current rates, $\$ 80$ per month, while an American engineer asks $\$ 240$ per month. An English fire man works for $\$ 20$ per month, and an American fireman an works for $\$ 20$ per month, and an American fireman wants $\$ 40$ per month; an English ordinary seaman has $\$ 12.50$ per month; an American seaman, $\$ 40$. Of course, no good American sailor could be tempted to work for less pay than sailor receives, and consequently the owners of American
shipping seek the cheapest help they can get. The item of wages, in the case of the Philadelphia company, is one demanding serious consideration. If, as the New York Bulletin says, an American steamer be manned with American seamen at current wages, her annual expenses would be greater than those of an English steamer with a crew of the same size, and to build a ship at home and send abroad for a crew to man it is, so far as we know, without precedent in maratime history. If we are ever to have ships, we must have sailors of our own to navigate them; and how can we have sailors of our own if the seamen's labor market is to be perpetually depressed by unrestricted foreign, competition? Philadelphia is a strong " protective" city, and it would not look very well for the owners of the new steamship line to import its sailors.

## POSTAGE STAMP HOLDER.

Every one has experienced the difficulty of carrying post age stamps about the person. If kept in the vest pocket or even in a portemonnaie, the warmth of the body is sufficient to make them adhere to their receptacle, thus rendering them

liable to be torn or defaced. Their small size also makes them easily lost or mislaid among the papers of a writing desk, so that there has been an actual need for some inven tion which, while retaining the stamps safely, should always present them in a convenient manner ready for use.
These requirements it is aimed to fulfil in the neat little device represented in the accompanying illustration. It con sists of a small cylinder of metal in which the stamps, after being rolled up, are placed, the ends of the rolls projecting through slots cut in the side of the cylinder. These slots are covered by a sliding cover, which is kept in position by means of a spiral spring. This cover is represented in the engraving as drawn back. The ends of the cylinder are closed by two small caps which are readily removed when necessary The end of a roll of stamps, after the latter is placed in ths cylinder, is drawn out through one of the slots until the perforated portion, attaching a stamp to the roll, is held be ween the edge of the sliding cover, when closed, and shoulder extending along the length of the cylinder. The
stamp is then readily torn off. If now the cover be pushed back, the end of another stamp will be found protruding from the slot ready to be drawn out when required. The cylinder is made in two compartments, each pierced with a slot o that stamps of two denominations may be carried.
The holder is small, may be easily carried in the vest pock.
ngs are given in full but not the specifications. Only the concluding portions, or claims, of the specifications are now published.

## AUTOMATIC FAN.

The invention we now illustrate is peculiarly applicable to the present season, as it is intended to provide simple and fficacious means for cooling the air in, and driving away in ects from, the vicinity of the person. It consists in an ar rangement of clockwork, by which fans of various forms can be conveniently operated in such positions as may be re quired.
The clockwork used is contained in a suitable frame, and is actuated by either a spring or weight, as found most convenient. The last shaft of the train carries a wheel which has a star-shaped slot or groove cut through or formed in its ace. A lever is pivoted at one end to the frame, and carries at the other a little pin and roller which enter the star-shaped slot or groove in the wheel. By this construction an oscilla ting motion is imparted to the lever by the revolution of the wheel; and, in consequence of the momentary check, given as the roller passeseither of the angles in the star, the mechanism also serves as an escapement. The stem of the fan is con nected in any suitable manner with the oscillating lever or its pivot, and the proper waving motion is thus communicaed to it.
Our engraving represents the apparatus attached to the

head of a bedstead and employed to swing a double fan for the two.fold purpose of cooling the air and keeping off flies and mosquitoes. The inventor states that the machine, when actuated by a weight, will run for six hours and a half where the room is ten feet high. He considers the employment of such a fan in the sick room most advantageous.
Patented through the Scientific American Patent Agency, February 27, 1872, for Mr. J. B. Williamson, of Louisville Ky., of whom further information may be obtained by addressing him through P. O. drawer No. 79, in that city.

## the british monitor "Glatton."

Last week we gave an account of the cannonade of thi new ship by the heavy guns of the Hotspur, at a range of 200 yards. We now present an engraving of the Glatton, to. gether with sundry other illtstrations, showing the effects of the projectiles upon the fourteen and fifteen inch plates com posing the Glatton's turret.
The Glatton carries a single revolving turret in which are mounted two of the heaviest guns in the service. The vessel is 2,700 tuns measurement, 54 feet wide, 264 feet long, and draws 19 feet. The following particulars of the trial are de rived from the Engineer:

The turret of the cilatton is roughly shown in horizontal section through the upper plates in Fig. 1. Her armor consists of plates laid on in two rings or tiers, each consisting of eight plates, the upper ring or belt having six plates of 12 inches thick and two plates of 14 inches thick, namely, those pierced by the portholes. The lower ring contains seven plates 12 inches, and one plate 14 inches thick, the last mentioned being that between and beneath the portholes. The backing, not being liable to cause injury from coming in contact with iron in the proximity of salt water, consists of oak, not teak. It is of such thickness as, with the plates, to make up a total of 29 inches everywherethat is, 15 inches of oak behind 14 inches of iron, or 17 inches of oak behind 12 inches of iron.
Behind the backing comes $1 \frac{1}{2}$ inch of skin, consisting of two thicknesses of $\frac{8}{4}$ inch plate; then vertical girders, 5 inches in depth with spaces between, and finally, what may be termed an innér skin or mantlet skin of 4 inch iron, to prevent bolt heads and splinters from flying into the interior of the turretand injuring the men working the guns on service.

Against the strongest portion of this structure, the 12 inch gun of 25 tuns weight of the Hotspur was brought to bear at a range of 200 yards, firing " Palliser large cored shot," or, speaking loosely, " Palliser shell without bursting charges.
As regards the object of the experiment, it was clear that hardly would be subjected to such a test as it would


Fig. 1.-Horizontal Section through Tvrr
even exposed to the fire of guns equal to that of the Hotspur at 200 yards range, it would be very unlikely that she would receive so fair a blow as on this occasion; while, should she be closer than 200 yards, although the shot would strike harder, it would be rather less likely to be quite true in its direction, from not having time to steady after leaving the muzzle.
The first shot struck at the spot marked I in Fig. 2, with effects shown in Figs. 1 and 3. The shot stood well up to its work, the front portion, as far as the front ring of studs, remaining apparently intact and buried deep in the turret side.
We have presumed to show in Fig. 3 the placeoccupied by the shot's head and the depth to which the point has penetrated; we believe this cannot be far wrong on the following grounds: The rear edge of the front studs was about $6 \frac{1}{2}$ inches past the face of the plate, and the projectile, if a Palliser 12 inch shell, would measure from this to the point nearly 14 inches.
Supposing our estimate to be correct, the following are the effects produced, shown by the numbering and arrows in Fig. $3:-(1$.$) The entire upper plate forced back to a distance at$ point of junction with lower plate of $5 \frac{1}{2}$ inches; (2) shot penetrated to a depth of nearly $20 \frac{1}{2}$ inches; (3) horizental joint between upper and lower plate opened to a width of 2 inches, the same effect being marifest in the corner of the top plate being lifted 2 inches higher than that of the adjacent plate; (4) the lower plate cracked in a vertical and laminating direc tion, if such a word may be allowed, and otherwise contorted at the edge; (5) a bolt driven some inches backwards, the head flying into the interior of the turret; (6) the double skin being bent back and forced open to a width of about 3 inches, the wood protruding; (7) the $\frac{1}{4}$ inch or inner skin torn open and hanging down to the extent of about 4 feet by 18 inches,
a number of rivet heads (as well as the bolt heads) being thrown into the interior of the turret.
Although a little below the spot intended, it was quite clear that this rofind gave a heavy contorting blow to the turret, the top of which had been so far forced back; it was, nevertheless, found that the turret revolved without the slightest difficulty, and for the object of the experiment the next round might be proceeded with.
Considering the spot struck by the first blow, it seemed advisable to pass on at once to the trial of a blow at the line of junction between the turret and glacis plate. This was done. By means of a mark painted at B (see Fig. 2) a shot was delivered at II, grazing the glacis plate at a point 3 feet from the turret and glancing into the turret, which it penetrated to a depth of about 15 inches, the shot, as before,


THE BRITISH MONITOR "GLATTON."
standing well up to its work and coming easily out of the hole, uninjured as far as the front row of studs.
The effects produced by this round are chiefly shown in Figg. 4 and 5. They are-(1) Penetration about $15 \frac{1}{2}$ inches; (2) glacis plate grooved to a depth of about $\frac{1}{2}$ inch, and cracked; (3) flange ring covering joint of turret and glacis, cut through and bent; (4) lower side of glacis plate bent back, and split open to a width of about 星inch; (5) (not shown in figure) a sort of binding plate, fixed on the lower edge of the armor


Fig. 2.-Front Elevation of turret from Firing Point after Striking at I. and il
side beneath the deck, broken off for a length of some feet, and the edge bulged downwards.
This round again severely tested the working of the turret not perhaps quite so severely as might be conceived were a similar blow to fall in a more downward direction, but quite


Fig. s.-Vertical Section through Portion Struci by Shot i. the kind of blow intended. On trial the turret was again found to work freely and easily. The ports, which up to this time had been covered and plugged up with beams of wood, were cleared open, and two rounds were fired from each gun; one a full blank charge of 70 pounds of pebble powder, and one a battering charge of 85 pounds of pebble powder with shot. The turret revolved easily in about a


SCALE $\frac{1}{40}$
Fig 4.-Vertical Section
Turret
Shot II.
minute, and we are not aware that any effort was used to ob tain speed. In short, the Glatton was in good fighting trim
at the conclusion of the experiment. Considering how great are the chances against a second shot falling exactly on a spot already struck, it would hardly be going too far to say that the Glatton was in nearly as good condition to go into ctaion as before the trial. Yet, it would be difficult to put her through a more severe ordeal except by bringing the 35 tun gun to bear on her, and as for the object of the experiment, namely, injury to the working of the turret, it may be doubted whether much more effect would, even then, have been produced. A plunging fire we are inclined to believe the most likely to jam the turret.
Erigineering says:-The result of the contest between the 25 tun gan of the Hotspur and the turret of the Glatton is almost an exact counterpart of that obtained by the trials which took place on Friday the 15th of June, 1866, when the armor of the Royal Sovereign was attacked by the 9 inch $12 \frac{1}{2}$ tun gun of the Bellerophon, and this trial again finds its counterpart in September, 1861, when Captain Powell conducted a lengthened experiment against the cupola gun shield of Captain Coles, on board the Trusty. In each case, the heaviest available artillery was brought to bear against the shield; in 1861 the 100 pounder Armstrong attacked the light cupola defence; in 1866 the $12 \frac{1}{2}$ inch gun was resisted by the $8 \frac{1}{2}$ inch plates and 14 inches of teak backing, which formed the protection of the turret of the Royal Sovereign, and in the recent trial (July 5th, 1872) the 25 tun gun throwing the 600 pound shot was repulsed by the 15 inches of armor backed by 14 inches of teak, which was opposed to it on board the Glatton.
Satisfactory as these results are in one respect, pointing as they do to the continual precedence which the science of defence takes over that of attack, it must nevertheless be borne in mind that such a partial and peaceful experiment as that of Friday last cannot be compared to the rough realities of war. So far as it went, however, the trial was all in favor of the turret, and while we may congratulate ourselves upon the power of resistance it exhibited, we can not regard with satisfaction the performance of the gun True, the Palliser shot stood well to their work, the first one penetrating through 14 inches of armor plate and $4 \frac{1}{2}$ inches of wooden backing, and making a gap of 2


Fig. 5.-Vertical Section through Portion Struok by ßhot II.
inches between the upper and lower 15 inch outside plates; while the second shot, glancing on the glacis plate, penetrated $13 \frac{1}{2}$ inches into the armor. But the most unsatisfac tory part of the trial lay in the difficulty experienced in getting the shots to go where they were wanted.
Twelve Locomotives Destroyed.-On the 24th of July the repair shops of the Erie Railway at Jersey City, N. J. were destroyed by fire, the loss of property amounting to nearly one million dollars. Five hundred men were thrown out of employment. Twelve locomotives were lost, together with many cars and much valuable machinery. Among the locomotives was a new one lately built by the Rogers Locomotive Works, at a cost of $\$ 40,000$.

During a recent Sunday school convention held in Balls ton, N. Y., one of the delegates hitched his horse in the street and allowed it to stand there in the hot sun from 8 o'clock in the morning until after 5 in the afternoon (nine long hours) without food or drink. It was a black, small pony with one white hind foot, hitched to a black gold mounted top buggy, in which was a white blanket trimmed with red. During the afternoon some one placed a card on the horse on which was printed: "I belong to a Christian I have stood here since morning without food or drink."
The caisson, on the New York shore, for the Brooklyn sus pension bridge, is now filled in, and the erection of the stone tower will proceed as rapidly as possible. The tower on the Brooklyn side has reached the hight of 105 feet above high water. The towers are to be 150 feet high. The wire cables will be 120 feet above the water. The span of the bridge is 1,600 feet.

The Croton lake from which New York is supplied with water is nearly forty miles distant from the city.

## Cotresymudewte.

the Eaurors are not responsible for the opinions expressed by their Corr spondents

## The Young Machinist once More

## To the Editor of the Scientific American

I noticed an article signed "A Young Machinist" on pag 20, volume XXVII, saying that he was glad he learned trade; but it would seem from his talk that he was sorry he did not learn the right one. It seems he is one of those who think no man should be allowed to run a locomotive unles he was a machinist. Now I think there are greater quali fications than that. No man, not even a machinist, can fac off valves or build boilers on the road, and make his time An engine must go ipto the shop for repairs, even if the en gineer be a machinist. From his communication, it would seem that he believes that the companies take men right of the street, who know nothing about grades, running just fast enough and not too fast, nothing about fire, water, or making time and keeping out of the way of other trains. I am not a railroad man now, but some time ago I was fireman for nearly two years. We were on a branch road away from the shop. The man I fired for served six years as fireman, which was the average time on that road; and he did not have his engine in the shop but once and that was for a broken tire What machinist could have done better'? But there was more than this. Twice it seemed as though we were rush ing to instant death, and, although his face was white, he showed no sign of fear but stood to his post like a man and brought his train out in safety. After we left that road; there was an engineer put on who was a machinist, a good man to repair engines, etc. One day, he was passing out of a station with a passenger train, running perhaps six or eight miles an hour around the first curve ${ }_{2}$ when he met a freight train com ing in; and without calling for brakes, without reversing his engine, without even shutting off steam, he took the leap and left his train to its fate, although had he stood at his post no accident could have happened, as the freight train wa stopped when they came together. The engines were damaged and some of the passengers injured, although none fatally. Which of the men was the best engineer? Which the safest for the public or Congress to trust their lives with

I clip the following from the Brotherhood of Locomotive Engineers' Monthly Journal
" Now take two young men, each 21 years of age. One ha served his time at turning tires, boring out cylinders, facing valves, and other work necessary for the building and repai of engines. The other has fired the usual time under the eye of some careful engineer, and has become familiar with has been on the engine in rain, snow, dew, fors in warm and cold weather, by day and by night, up hill and down, through the forest and over the open plain. He has seen the enginee overcome all the difficulties that are apt to occur; he has as sisted him to take down and put up every part of his engine he has been with the locomotive in all its vicissitudes; $h$ has, by constant use and observation, learned how tires should be turned, valves faced, etc., and now he is declared master of his trade. And now they stand side by side, each one ready to compete for the championship of the iron monster. Now take the difference in the two men. Th former one has not been accustomed to move his iron steed he knows nothing of railroading and its ups and downs. In the latter, the locomotive has been his protégé, and he has traveled miles enough by it to carry him many times around the globe. And now I ask all manner of men: Which train are you going to take? Husbands and fathers, in whose car will you trust your wives and

I do nitarkness ?
I do not wish it to be inferred that I think a machinist cannot be an engireer, for such knowledge would be a help to him ; but I think they are two different trades, and I do not like to see a man of one trade call a man of another a "ignorant wretch" because he gets more pay than himself, or because he does not understand another trade than hi own in all its details.

Waterbury, Conn.

## A Question in Architecture.

## To the Editor of the Scientific American

The county Board of Supervizors of this (Dickinson) county is rebuilding the court house of bricks which were in th walls of the original building burned last fall. The walls were then blown down by the wind. The bricks were cleaned off and relaid into a wall the second time, which was also blown down when it had got up to the middle or the second story windows or thereabouts. The bricks were then re cleaned ; again the wall was relaid with the same bricks, the inner course being filled up with pieces of brick. This wal for the court house and public offices is $30 \times 50$ feet on the ground, the partition walls being all lath and plaster. The wall is 24 feet high and only 12 inches thick from bottom to op, the former wall which was burned was 20 inches thick below and 16 above.
This builaing stands on the bighest elevation, probably the State, with not a tree or shrub for miles to break the orce of the terrible winds which sweep over our prairies Now I contend that these walls are not safe but, on tite con trary, are a perfect mantrap and will probably kill some body. Wbat is your opinion?
T. S. Seymour.

Milford, Iowa
IThis is not surprising in view of the mania at the West for thin walls. No amount of experience in the disastrous results from weak structures seems adequate to insur

Chicago was owing in no small degree to a deficiency of the thickness of the walls. Party walls 8 inches thick wer quite common there, and some were only four inches. Very all to the wallar stood arter the timber was burned so walls to stand alone. They depended upon the timber for arsort; and as soon as this support was removed the wall fell, leaving an open field for the flames. Chicago was es sentially a wooden city, although apparently built with rick.
Buildings, to be durable, should have walls strong enough to stand alone. The walls of the court house above referred o, 50 feet long, unsupported with cross walls at any inte mediate point, ought to be two feet thick in the principa story and twenty inches thence to the roof; and they should be built with new, hard, whole bricks well kedded in a suf ficiency of best mortar. Built in this way, their stability would be unquestionable. But built as above described, the builders would bave continuous employment in restorin hem after each storm of wind.-Eds.

Estimating the Distance of a Lightning Stroke. To the Editor of the Scientific American
During the great thunder and lightning storm in Philadel Dia, in the evening of July 4 last, frequent discussions aros regard to the probable distance of thunder and the velo ity of sound in air. Some maintained that sound travel er a mile per second, and others said that the velocity of ght must be considered in estimating the distance of th under, all their opinions varying greatly from establishe acts in physics, for which reason I propose to send you table on that subject, which you may consider worthy of publication in the Scientific American.
distances in feet which sound travels in air.

| Time of | $50^{\circ}$. | ${ }_{60}$ Tempe | \% ${ }^{\circ}$ | $80^{\circ}$. | $90^{\circ}$. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| onds | Feet. | Feet. | Feet. | Feet. |  |
| 1 | 1,109•6 | 1,120.6 | 1,131 1 | 1,142:5 | 1153.2 |
| 2 | 2,219 2 | 2,241•2 | 2,262•2 | 2,885.0 | 2,306 ${ }^{\text {a }}$ |
| 3 | 3,328.8 | 3,361•8 | 3,393•3 | 3,427.5 | 3,459•6 |
| 4 | 4,438.4 | 4,482•4 | 4,524•4 | -4,570.0 | 4,612•8 |
| 5 | 5,548.0 | 5,603.0 | 5,655•5 | 5,712-5 | 5,766.0 |
| 6 | 6,657.6 | 6,723.6 | 6,786.6 | 6,855.0 | 6,919•2 |
| 7 | 7,767.2 | 7,844*2 | 7,917•7 | 7,997.5 | 8,072.4 |
| 8 | 8,876.8 | 8,964• | 9,048.8 | 9,140.0 | 9,225•6 |
| 9 | 9,986.4 | 1,008:5 | 1,018.0 | 1,028.2 | 1,037.9 |
| 10 | 1,109•6 | 1,120.6 | 1,131 1 | 1,142:5 | 1,153'2 |

The velocity of lightning is probably not less than the con duction of electricity through the best conductors, or about 200,000 miles per second, and the time occupied for only a few miles is so small that it could not be appreciated or re corded without extraordinary instruments for that purpose for which reason it is disregarded in approximating the dis tance of thunder.
The occurrence of a lightning fla h cannot be anticipated, and we are therefore generally unprepared to record the exact moment, which frequently comes unexpectedly, when o appropriate time keeper is at hand. In a room where th eats of a clock's pendulum can be heard or seen, it is easy to cunt the beats between the lightning and the thunder, by which the time can be approximated. With some practice he beats of seconds can be counted with tolerable correct ess without the aid of a time keeper, which practice ha een of great service to me in astronomical observations We should practice counting seconds with the second hand of a watch until the countings agree, without looking at th me keeper for a minute or two. The counting should no differ more than one second in a minute, by which means th ime between the lightning and the hearing of the thunde an be closely approximated
In observing the altitude of the sun or lunar distances, a ea, it is customary to keep a watch ready in the hand, or to tation an assistant at the chronometer to note the time when he observer says "Stop;" but there are known cases whe e captain has taken observations without a watch or assis , and walked slowly and comfortably to his cabin an oted the time of his obsorvation from the chronometer, wit no little amusement to the mates and others, who naturally supposed that the captain's observation could not be ver correct; but to their surprise it was found to be as correct a heir observations with ordinary precautions. The fact wa at the captain counted in his mind the beats of seconds, and deducted the sum from the time observed on the chro ometer.
I have made a great many astronomical observations of different kinds in the interior of South America, particularly of eclipses of Jupiter's satellites; but when I have no instru ent connected with the telescope for the purpose of record ing time, I have never attempted to note the time of observa ion directly, but counted the beats of seconds and turned myself comfortably to the chronometer and deducted th counting, which generally amounted to four or five seconds The practice of counting seconds correctly is very useful is great variety of cases. In actions of very short duration, say less than three seconds, it is best to count half seconds even four times in a second, and the time may be deter John W. Nystrom.

## Capacity of the Bioston Coliseum.

To the Editor of the Scientific American:
The Coliseum was estimated by the Boston newspapers as capable of seating an audience of from eighty to a hundred and twenty thousand, besides a chorus and orchestra of twenty thirty thousand ; so thataverages of " half houses" were ex pected to be sufficient to yield immense profits. The houses, lost.

Now for the explanation by feet and inches. According to he lithographed plans of the building, the entire seating ca pacity of the auditorium was less than 17,000 persons, and hat of the orchestra and chorus less than 12000 . Deductin the obstructions of posts and stairways a maximum of 28.000 persons might have been seated at one time, of whom 16,500 might be classed as audience. At no time was the numbe f persons standing at the concerts greater than the numb f empty seats, and certainly the "deadheads" number 2,500 , so that it were unfair to estimate for more than 14,000 paid tickets for a full house, or for an average exceeding 9,500 paid-tickets to all the concerts. This, if substantially correct accounts for the failure financially.
The space under the galleries was almost entirely occupie as reception rooms, offices and passage ways, so that we hav nly to deduct, from the total of some 200,000 square feet of surface, the rather small estimate of 50,000 square feet of tairways and passages, not under the galleries, and divid the remainder by the five feet which a person siting requires This gives a maximum capacity of 30,000 persons, and is quite near enough to prove the substantial correctness of the pr vious figures.

## Demoralization by Leisure.

the Editor of the Scientific American:
The article in your issue of July 21st, credited to the Christian Union, seems to me to demand some notice, as, I hink, it contains more absurdities than I have ever befor een in the same space. The world would be much batter of if every human being, who has the strength, would work rom one to ten hours per day, as circumstances required, some useful and productive employment. Mental strength can only be maintained by a proper amount of physical ex ercise, and it is far better that this should be useful tha useless. When all do their part, an average of five or si hours' labor per day will supply all our wants, relieve th verworked, strengthen those who need it, banish sickness and leave plenty of time for mental improvement and recrea ion. The "leisured class," with exceptions as rare a ngels' visits, are worse than useless. For proof I point you to the aristocracy-cursed nations of the old world. Th more society has of this class, the worse it is off, for the mere borer sink into a condition of stolid ignorance and brutal ity, while the " leisured class" plunges into a gilded debauch ry, destructive of every good principle.
Society owes everything to labor, mental and physical nothing to the " leisured class."
A pampered bigot may charge upon our Heavenly Fathe he inequalities caused by man's injustice, but such blasphemy an never emanate from the brain of any true Christian
I could fill volumes with the sins and shortcomings of this called "leisured class," but will only mention one or two. They make a mock of marriage; they tempt thousands, wh ould otherwise be ornaments to society, to a life of shame; ad, after the poor victim has spent the best portion of lif in pandering to their base passions, and a fresh one is wanted he is turned into the street to sow the seeds of moral and physical pollution among the laboring classes. But enough of this. I am very glad to find a grain of sense and truth at last, where he says: "The safety and progress of human ity, as a whole, depends on each man's serving faithfully;' but if he expects it to be done without murmuring, he ex pects too much. Where but little is given, but little is re uired, and the reverse.
I am a working man, but I believe all strikes, however the may terminate, injurious to the working classes, and I may ive my reasons some day, when I have leisure, through th ive my rea
ScIENTIFIC
J. E. S.

Portland, Me

## The Underground Rainway in Baltim ore.

To the Editor of the Scientific American
With all the advantages of education, engineers of public works appear to be at fault at times. The Potomac tunnel now being constructed under one of our strects, passe through a variety of soils and, in some places, through solid rock. At first no counter arches were built on the soft clay soil; hence the great weight of superstructure and filling on top to line of strut was too great for the soft clay founda ion, causing the whole superstructure to sink, throwing the clay up in the roadway. Of course there was nothing eft but for the engineers to have counter arches built on all uch soil.
A common observer would have supposed that, had they ver engineered a similar work, they would not have risked his one without the counter arches.
Baltimore, Md.
J. W. L

## How to Destroy Wiggle

To the Editor of the Scientific American:
I have a number of water barrels around my outbuildings, esides a cistern. The water in the barrels suits best to water plants, being warmer than cistern water.
But the wigglers breed in it by thousands. I have bee trying to destroy them, and have found out what will kill every one in an hour. Pour a few drops of burning oil upon the water, sufficienr to cover the surface; stir a little to be sure of completely doing this, and draw off the water below Add oil if anything disturbs the covering. It has answered well with me.
Cleveland, 0.
W. WARD.

AT the recent exhibition of the Royal Agricultural Society Cardiff, Wales, an eight horse portable engine, made by Clay ton \& Shuttleworth, worked for five hours under a consump tion of 242 lbs . of coal per horse power per hour-an un paralleled result for a non-condensing engine.

## Small Fast Steam Propellers Again. To the Editor of the Scientific American:

A plain working man, laboring 60 hours in the week, with but one day in that time to call bis own, I had not expected, in publishing an article in your valuable paper on this sub ject, to provoke a correspondence from nearly every State in the Union, making enquiries how such a vessel can be procured, how she should be constructed, her cost, etc. At the risk of repetition, I will ask your kind assent to reply to these correspondents through your valuable paper. The boat described before is 50 feet long, 45 of which is hull and 5 feet of it overhang at the stern, beneath which the propeller is placed. She has a forecastle deck of about the same size ( 5 feet), is 7 feet beam, and 54 inches depth of hold. Sheis built of oak by a common house carpenter who had worked on canal boats in the State of New York. The stern and stern posts are very heavy and strong, as are the floor and side timbers, all well ironed, and as staunch as could be made. The hull is flat bottomed and a foot narrower at the bottom. A deck 40 feet long, 8 feet high from the bottom floor, protects the machinery and passengers from the woa-fan-shaped blades 2 feet long, and 2 feet wide in the widest fan-shaped blades 2 feet long, and 2 feet wide in the widest
part, bolted to a wrought iron hub with flanges set at an part, bolted to a wrought iron hub with flanges set at an
angle of $45^{\circ}$ with the shaft. The machinery has already angle of $45^{\circ}$ with the shaft. The machinery has already
been described. The whole cost of this boat has been about $\$ 1,500$; and for general jobbing, towing, and pushing rafts, or work where speed is needed, she is better worth the money than many boats which cost four or six times as much.
We are indebted to your valuable paper for much infor mation which has aided us in making this boat a success.
Without any previous experience in building such craft, we Without any previous experience in building such craft, we
found by reading the English article you published that found by reading the English article you published that
the wheel was too large for the power. By cutting out one the wheel was too large for the power. 2 feet wide instead third of the filling, making the blades 2 feet wide instead and gave fully that much or more speed to the vessel.
In the former article, I said she would carry 20 or 30 pas sengers. On July 4th, the engineer had a benefit by going short excursions, and as her speed had attracted public at tention she was crowded all day. She carried 46 passenger with perfect safety, and only seemed to run faster for being
so heavily loaded. That day she repeatedly made a mile in so heavily loaded. That day she repeatedly made a mile in
4 minutes, and in calm weather she regularly crosses the river, 4 minutes, and in calm weather she regularly crosses the river,
five eighths of a mile, in 2 minutes and 40 seconds. Her economy of fuel is remarkable, burning only 10 bushels of rather poor soft coal a day; and her entire crew consists of one man, who manages her with perfect ease and safety,
the steering wheel being close to the engine, and every. the steering wheel bein
thing very convenient.

As quite a number of your readers appear to want a boa of this sort, there are doubtless competent draftsmen in New York who would furnish complete drawings to build by The circular slide valves are used on the engines of thi boat with great success.
J. A. G.

## Force of Falling Bodies To the Editor of the Scientific American:

Since you are publishing a series of articles on "Weight Pressure, Power, Force," etc., it would be useful to so explain the acting force of a body in motion, its momentum or stri king force, that, if such a thing be possible, your readers may understand what it means, by what it is measured, and how determined.
While this is one of the simplest problems in physics, as well as one of themost essentially practical, it is one of those of which the majority of the people are most profoundly ig norant, as is shown by the frequent questions on the subject in your valuable paper, and by the replies, no two of which are alike, and which indicate that the correspondents ar hopelessly befogged.
In your number of July 6, page 10, a correspondent-mis led by Haswell probably-estimates the force of the ham mer, weighing three tuns and falling four feet, at over 160, force? To what is it equal? What work will it do? He does not say foot pounds, and if he means that, he is wide of does not say foot pounds, and if he means that, he is wide of
the mark in his estimate. A blow cannot be compared with the mark in his estimate.
It should be universally known, if possible, that force is estimated by the measure of the work it is competent to per form, the number of pounds it will raise one foot high The force which will lift one pound one foot is called a foo pound, and is the unit used to express the amount of a force. Gravitation, being a constant quantity, is a convenient standard, and force measured by the amount of gravitation it will overcome affords a statement quite intelligible to any intelligent person. Next, it should be known that this same one pound, in falling freely one fout, will accumulate the same scent the same amount of force which it took from it in its ascent, and therefore the force of the blow will be just one foot pound; and, if converted into heat, would produce exactly the amount of heat which would be required to lift the one pound one foot high again.
In general, the force with which any falling body will strike is precisely the amount required to lift the same body to the hight from which it fell. When, therofore, the weight and hight are given, their product is the force of the blow in foot pounds, and, in the case of this hammer, would be $6,000 \times 4=24,000$ foot pounds. The force of a " weight of one pound falling two feet" would be $1 \times 2=2$ foot
pounds, while Haswell's " Engineers' and Mechanics' Pocket Book," page 419, gives it at $11: 34$ lbs., whatever that may mean.
If the velocity is given, we find the hight as follows: D-
viding the velocity by $321^{1}$ (the velocity acquired in each second) gives the time of fall in seconds, and multiplying the square of the time by $16_{\frac{1}{1} \frac{1}{2},}$, we have the hight from which which, of whicen, of course, is also the with the same initial velocity before its force would be expended in overcoming gravitation. Obviously, the force of the blow will be the same, with the same velocity, whether the motion be downward, upward, or horizontal; hence, to find the force with which it is moving, we only require to find the hight from which a body must fall to acquire the given velocity, and said hight, multiplied by the weight, gives the striking force in foot pounds, or the amount of work the body would perform, the resistance it would overcome, the weight it would lift one foot, or the heat it would produce; and also, what is the same thing, we have the amount of force expended in imparting to the body the given velocity.
The general confusion of ideas upon this subject is probaoly largely due to the fact that the text books differ widely and the majority of them are entirely-wrong, as they almost
all teach that treotziking force is proportional to the velocly, whereas it is in velocity, as is readily shown by the law of falling bodies enunciated in the very same books.
The formula above given is far more simple than the vari. ous arbitrary and fantastic ones so often presented by your correspondents, and has the peculiarity of being correct, and consequently consistent with all the laws of motion; and if you will give me space for a few examples, I believe its application will be perfectly plain to your readers. Instead of piication win velocity by $32 \cdot 16$ and multiplying the square of
diving dividing the velocity by $32 \cdot 16$ and multiplying the square of
the quotient by 16.08 , we may, of course, obtain the same rethe quotient by $16 \cdot 08$, we may, of course, obtain the same re-
sult by the shorter process of dividing the velocity by 8.02 , sult by the shorter proces
and squaring the quotient.

1. A one pound ball moves 1,000 feet per second; $(1,000 \div$ $8 \cdot 02)^{2}=15,545$. Its force then is 15,545 foot pounds, and as it weighs one pound, if its motion were directly upward it would mount to the hight of 15,545 feet, and on returning would acquire in its descent the same velocity of 1,000 feet. The force expended, then, in imparting this velocity was equivalent to that required to raise 15,545 pounds one foot.
2. A twenty-four pound ball has a velocity of 50 feet per sec ond ; $(50 \div 802)^{2} \times 24=931 \cdot 44$ foot pounds. If this twentyfour pound weight were a hammer with a stroke of 3881 feet, it would acquire a velocity of 50 feet, and would strike With a force of $38 \cdot 81 \times 24=931 \cdot 44$ foot pounds, and this mount of force, in any available form or mode of manifesta tion, would be sufficient to impart a velocity of 50 feet to a
mass of 24 pounds, or to lift 24 pounds 38.81 feet, or to lift mass of 24 pounds, or to lift 24 pounds 3881 feet, or to lif
or throw one pound $931 \cdot 44$ feet high, or $931 \cdot 44$ pounds one foot high. In these calculations, there is no allowance mad or atmospheric resistance.
W. h. Pratt

Davenport, Iowa.

## Novel Experiment by Tyndall.--Ignition

In a recent lecture before the Royal Institution, Professor yndall said:-
Most of you know that wonderful prediction made by Newton respecting the diamond; his powerful mind, antedating the discoveries of modern chemistry, pronounced it to be an
unctuous or combustible substance. We now know that the diamond, beautifully transparent, highly refractive as it is is identical in its composition with charcoal, graphite, o lumbago.
A diamond is pure carbon, and when burnt as $I$ am about to burn it, yields the same products as carbon would if burnt in the same way. I have a diamond held fast in a loop of platinum wire; I heat it to redness in this hydrogen flame, and then plunge it into this glass globe containing oxygen The glow, which before was barely perceptible, extends and becomes brighter as you see. The diamond would go on
burning in that quiet way until totally supply of oxygen were kept up. Inordinary air, the diamond will not burn; the oxygen is too much diluted by the nitroen; its atoms are too few in number to carry on an effec tive attack, but when concentrated, each of the atomic pro jectiles is assisted by its neighbor, and as it strikes the sur face of the diamond, its motion of translation is arreste and converted into the motion which we term heat, and the heat thus produced is so intense that the crystalline carbon is kept at nearly a white heat, so that the atoms of carbo
and those of oxygen unite, and carbonic acid gas is pro duced.
Faraday describes the combustion of the diamond in oxy gen, the necessary initial temperature having been derived rom the rays of the sun. The experiment is described in the admirable life and letters of Faraday, by Dr. Bence Jones.
This experiment, he describes as being quite new $t$ ) him, and as never having been seen before. I hope to show you n experiment of a similar character which has never bee rays of the ignition of the diamond by the concentrate order to prevent chilling from currents of air, I have taken the precaution of surrounding the back of the diamond with hood of platinum wire
I now insert the diamond in the focus of the electric beam, nd in a few moments the diamond becomes very hot. think that will do. I now plunge it in the oxygen. There t glows, and so it would continue to glow, and would burn away just like coke, also leaving the same residue behind In both cases the particles of oxygen impinge upon the car bon, grasp its molecules, and convert them into carbonic

I made reference to the luminosity of flame proceeding from the presence of incandescent solid particles of carbon. An experiment has been devised by Mr. Cottrell which illustrates this, and as it is his experiment I will allow him to perform it.
He will fill this globe with oxygen from the iron bottle by displacement in the usual way. That being done, he now ignites a piece of boxwood charcoal, attached to the cap of the globe by a stout wire, and immerses it in the gas; it of course burns with those beautiful scintillations you have so often seen in this room. But instead of allowing this beautiful combustion to proceed as it is now doing, he directs upon the charcoal a jet from the bottle of compressed gas, the con. sequence being that the combustion is marvellously enhanced, and, from the currents created by the rush of the gas, he particles of ignited carbon revolvein perpetual orbits, at a little distance producing all the effect of a magnificently brilliant white flame. It is my firm conviction that the constituents of ordinary flame to which we owe its light are mainly these solid particles of carbon; though I must also state that a very distinguished friend of mine holds a differ-

My intelligent assistant, Mr. Cottrell, some little time ago arranged two circular gas jets of small bore, so that they should impinge directly the one upon the other; the two flames became blended into a horseshoe form, the extremities of which were spirals, and these spirals perpetually threw off particles of solid carbon. I take this as being another proof of the correctness of Sir Humphrey Davy's old notion that the luminosity of flame was due to the incandescence of some part of the matter which was burning.

## Mosquito Manure--A Summer Yarn.

Nature has her compensations. At Stratford, Conn., where the mosquitoes are as thick as a fog, lives an ingenious Yankee, so they say, believe it who may, who puts these insects to profitable uses. He has invented a large revolving scoop net, covered with lace, which is put in motion by a windmill, water power, or steam. The lower half of the scoop is placed in water. The upper half moves through the atmosphere and at each rotation draws immense numbers of the 'squi toes down into the water, where they drown and sink to the bottom. Every revolution of the net draws in an ounce of mosquitoes, or a tun for thirty-two thousand turns of the ma chine. The mosquitoes thus collected make a splendid manure for the land, worth forty-five dollars a tun.
We know that other insects-the cochineal for exampleconstitute most valuablearticles of merchandize ; and it may be that this Stratford mosquito manure will yet become a standard article of commerce. The possibility of making mosquito sirups, glues, dyes, and other goods, from the insect mass, remains the subject for experiment.

## Patent Infringement Case.

United States Circuit Court-District of Massachusetts, in Equity.
Alzirus Brown versus J. R. Whittemore and others.
This was a case of allegəd infringenent of the complain. ant's patent, applied for June 1, 1858, issued in October of
hat year, and reissued June 16, 1868. The case was argued that year, and reissued June 16,1868 . The case was argued
on the specification of the reissue, which, taken with the drawing and model, shows an improved horse rake for rak ing hay and grain, in which the wire teeth are coiled round a rake head which is hinged to the rear ends of the shafts, just above and parallel with the axle; this rake head is con nected with two levers and treadles which enable the opera-
tor to raise the rake with his right foot and to hold it down with his left; a handle is attached to one of these levers to work the same effect by hand. The second claim is for th combination and relative arrangement of the hinged rake head with the supporting axle and carrying wheels, whereby the head is supported above the rear upper edge of the ale; and the lower ends of the teeth, when gathering the forward of a vertical plane on a line with the rear edge of the wheels; and the fourth claim is for the arrangement of the rake head and foot treadles, or either of them, in relaIn to each other and the axle.
In the opinion delivered by Lowell, circuit judge, the court held that a horse rake made and sold by the defend ants came within the claims stated, unless they were con-
strued very narrowly. The defendant's position was that in view of earlier inventions the claimant must either submi view of earlier inventions the claimant must either submit
to such a limited construction or his claims were void; but hey failed to show that the patentee himself, or any one else, had made the particular combination so early as to de feat these claims, if construed according to their plain and bvious meaning; and it was held by the court that ther was, therefore, no occasion to restrain them to mean only a
rake head hinged to the shafte in the precise way shown by the patent. In the plaintiff's rake, the hinges are attached to the outward lower corner of the rake head, and in the defendant's, to the upper inward corner. It was insisted by the defendants that this feature in the plaintiff's patented machine was the only one in which it differed from its pre decessors, but it was shown in evidence that the relative is useful whether the hinges are placed on the upper or lower edge of the rake head.
The opinion of the court was that the two claims were valid and were infringed by the defendants.
Decree for the complainant
Thos. H. Dodge, Esq., for
, Dod

A Railmay Bridge eleven hundred feet long buili in Four Days.-The Linden bridge over the Surquehanna river near Williamsport, Pa., was recently burned on a Thurs day evening; workmen and materials were assembled nex day, and on the following Tuesday the cars were running over the new bridge, 1,135 feet in length. The original bridge was of the Howe truss pattern, roofed and lined insid and out. Cost, $\$ 110,000$.

## IMPROVED SHEET IRON ROOFING.

Our engravings illustrate a goodform of sheet iron roofing, which was patented by Mr. W. S. Belt, of Cincinnati, Ohio, Aug. 8, 1871.
Fig. 1 represents the roofing partly applied to the roof and sides of a building. In Fig. 2 is shown the under side of one of the iron sheets of which it is composed. It will be observed that the sheet is triangularly crimped at its sides in such a way as to allow the crimped portion of one sheet to overlie the crimp of another, (in the manner shown in Fig. 3), and that the lower side is provided with fastenings which are riveted to the plate. The overlying crimp are riveted to the plate. The overlying crimp
has a perforated flange, through which two has a perforated flange, through which two
adjacent sheets may be nailed to the sheathadjacent sheets may be nailed to the sheathing or rafters of the roof, as shown at A, Fig. 3. It can readily be seen that, in thus employing the roofing, each sheet is fastened by both of its sides to the supports. The nail used is barbed, and as the fibers of the wood, into which it is driven, soon resume the position from which they are displaced, a very firm hold is taken by it. A lead washer, as at $B$, is placed between the nail and the plate, and by its use any unevenness of surface is accommodated and an air and water-tight joint formed on driving the head of the nail joint into the lead. The sheets are eight home into the lead. The sheets are eight eet long and two feet wide between centers of crimps, and, as manufactured, are coated n both sides with pain
Fig. 4 represents the application of the sheets to a sheathed roof, in which case rough boards of an even thickness are all that is necessary for the sheathing. Flg. 5 shows the mode of applying the roofing to purlins where no sheathing is employed. In this case the purlins may be placed any distance less than eight feet apart,and triangular strips of wood are nailed to, and at right angles with, them, two feet apart between centers, so as to fit under the crimps and support the sheets. ches wide may be nailed to the purlins, and thoards three tiens to the may plied to them shents the mode of attaching thown in Fig. 6 , which represents the mode of attaching the rafters without sheathing are to be cov. red. In the latter case, strips of board are let in, on a level win the upper sur ace of the rafters, for the ends and centers of he sheets to rest upon. The triangular strip may be placed under the crimp in any case i desired. The ends of the sheets are joined by overlapping them, or by bending them so as to form a lock joint, which, as they are well annealed, can readily be done. The sheets are also easily made to conform to the angles of roofs of either ordinary or peculiar form so as to make perfectly tight joints and fully preserve the effective character of the roofing It is applied with such facility, aided by the inventor's directions, as to require no skilled workmen to put it on.
Mr. Belt has also devised a combination iron frame to support his roofing, by the use of which cost is lessened and its fireproof quali. fies hightened. Its construction will be un derstood from Fig. 1, where the rafters are seen to sustain bands stretched between them. These bands are made of strap iron and are placed $46 \frac{1}{2}$ inches apart. To these bands the fastenings on the under side of the sheets be fore alluded to, seen in Fig, 2, are hooked, and the roofing thereby secured in position as seen in that portion of Fig. 1 which shows the under side of the roof. By using iron for the rafters, a fireproof roof is made.
Many advantages are claimed by the inventor for this mode of roofing. He says that the crimp gives so much stiffness to the sheet, it is enabled to sustain itself and also consid erable weight in the center, when supported only by its ends. There is, consequently, no lia bility to " bag."
Its fastenings are so secure as to prevent any wind af ecting it, and, at the same time, if damaged, it can easi-

taken out and replaced. The entire roof can be taken off one building and put on another, without damage and at trifling expense, for which reason it is considered admirably adapted to the plain buildings. In all these respects, it sucel the
corrugated; while the same weight of metal in the crimped

The machine is represented, in Fig. 1, with a portion of a protective shield broken away to show the parts. It consists of a series of bellows, A, which are placed between and at tached to the two disks, B. These disks are mounted on jointed shaft, as shown in the horizontal section (Fig. 2), the halves of which are set at an obtuse angle in such a mann


Fig. 5
Fig. 6


BELT'S SHEET IRON ROOFING.
form covers twenty per cent more surfacs than if corrugated. in roofing warehouses and small buildings on this plan, from wo thirds to three quarters of the wood usually employed


ROTARY PRESSURE BLOWER.
Further information can be obtained by addressing the in ventor at 56 and 58 East Third street, Cincinnati, Ohio.

## ROTARY PRESSURE BLOWER.

The great expense attending the use of the piston blower in connection with blast furnaces, forges, etc., and the cum brous nature of the apparatus itself, have led to the employ ment in its stead of various forms of fan blowers, notwith standing that the latter have to be run at a high rate of speed, and consume a great deal of power without producing a pro portionately powerful blast. This absence of effect arise from the fan not being positive in its action, the pressure of its blast resulting only from the momentum of the air. The production, therefore, of an effective positive pressure blow er, which would compare favorably in convenience and ex pense with the fan, has long been aimed at by inventive skill, and there is no doubt that such an apparatus would be a val uable addition to the resources of the mechanic in many branches of industry. We this week illustrate a blower which is designed to meet this want, and which we think possesses points of merit.
that the disks are caused to revolve in vertical planes which incline to each other. BJ the revolution of the disks in this opposite sides of the bellows are made alternately to approach and recede from each oth. er, and the bellows are thus brought into action by direct rotary motion. In Fig. 2 are shown the points of greatest expansion and contraction consequent on this motion. The disk next the driving pulley is provided with an aperture, C, for each pair of bellows in the series (shown in detail in Fig. 3), through which the air passes into and from the bellows. D is an air cbamber, which is open on the side next the disk, and covers that half of tho cinclo of aportureo from which the air is being expelled. The wind is conveyed from the air chamber to the place intended by means of the pipe, E . The apertures connected with those bellows which are expanding are always below the air chamber and open to the atmosphere A joint, which is sufficiently tight for all practical purposes without causing much friction is purposes without causing much friction, is made be tween the air chamber and the disk by facing them to correspond, and holding the former against the latter by means of the set screws seen in Figs. 1 and 2. In order to prevent
danger of bursting the machine, should the danger of bursting the machine, should the eduction pipe get accidentally closed up, india rubber or steel springs are placed between the air chamber and the set screws, so as to allow the air to escape should the pressure within become too great. From the construction described, it will be seen that (in the absence of the springs mentioned) all the air which enters the bellows is discharged uction pipe, and by the positive nature of the th rough the eduction pipe, and by the positive nature of the action, the amount of pressure developed is only limited by the strength of the material and the power applied. The
bellows are made of the best material, and are attached to the disks, which in practice are of cast iron, the disks, which in practice are of cast iron,
by means of screws, so that they may be by means of screws, so that
readily removed for renewal.
readily removed for renewal.
The economy attached to the use of The economy attached to the use of
this blower will, the inventor says, well this blower will, the inventor says, well
warrant the renewal of the hide or leather as often as may be necessary. In rare cases, where a large volume of air under heavy pressure is needed, it is better to run two smaller blowers, instead of one large one. They might be run on one shaft, with the driving pulley between them. The blower is, in practice, all cast iron with the exception of the leather and the shaft, which lat. ter is made of wrought iron. The inventor says that it can be constructed for as little as one of the best kind of fon machines, and much or one much more cheaply than blowers made on ly ly superior to either. It is intended to be run at a low speed, say from two to three hundred revolutions per minute or less, according to size. The blower may be made to exhaust, either by reyersing the motion, or by placing an air vessel, with an induction pipe attached, over the lower apertures.
The advantages which this apparatus is claimed to possess are cheapness of con. struction, saving in power, and increased pressure, volume, and steadiness of blast. When used with a blast furnace, the tweers are always kept free, which result is not obtained by a fan. It is noiseless in action and is applicable to all purposes to which a blow is applicable to all purposes to which a blower cair through, or arbauting it from, ingair through, or exhausting it from, pneu matic dispatch tu etc. For further infor maiion, address Mr. J. Pusey, 228 South 3d street, Philadelphia, Pa., who is the sole proprietor of the patent, and who is desirous of disposing of rights in whole or in part.


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## COSMICAL CAUSES OF CHANGES OF CLIMATE

In a former article, under the head of "Changes of Climate," we have given some of the arguments adduced in favor o the haeory that our planet is still undergoing the cooling process, which geology proves that she was undergoing mil lions of years ago. Another argument in favor of this theory not founded on observation, is the a priori consideration that our earth possesses, interiorly, a temperature far above that of the surrounding planetary space, and that, therefore, ac cording to the laws of distribution and radiation of caloric, a slow loss of heat must take place, tending ultimately to make the temperature of our whole globe equal to that of the space she moves in; that is, according to Pouillet, $240^{\circ}$ below the zero of Fahrenheit
The solar caloric radiation, enormous as it is, is withou influence on the temperature of the earth'sinterior, it having been proved that the whole effect penetrates the surface to a limited number of feet only, and is as easily lost by radiation during the night and the winter as it is received during the day and the summer season. The incapability, of the appar ently powerful solar radiation, to prevent a planet from los ing its own heat, is forcibly illustrated by the present condi tion of those tops of our earth's mountain peaks which are elevated above the snow line, where, even under the tropics, a perpendicular midday sun is unable to raise the tempera
ture above $32^{\circ}$ Fah. The present condition of our moon is ture above $32^{\circ} \mathrm{Fah}$. The present condition of our moon is
another case in point; we know now that this satellite has another case in point; we know now that this satellite has
cooled down far below the freezing point; that practically it has no atmosphere, and that all its water, long ago, has been chemically combined with the lavas of its surface into hydrated rock, similar to those of our earth, which contain, in solid condition, a mass of water perhaps equal to half that of our oceans. The opinion, of some astronomers of the former century, that the side of the moon turned towards the sun should be subjected to great heat, is sufficiently refuted by the observation of the effects of the
above the snow line referred to.
These arguments serve to show the incapability of the sun to prevent the cooling down of the planets and satellites under its influence. In fact, our whole planetary system is an illustration of this simple law of caloric radiation: that the smallest bodies will require the shortest time to cool down, while inversely, the largest will remain hot the longest. The smallest planetary body, with whose physical condition we are acquainted, is the moon, and this has cooled down far
below the freezing point. The next planetary body, the only one, in fact, with which we are intimately acquainted, is our earth, and this has cooled down, exactly so far as to allow the solar radiation to develop vegetable and animal life on its surface; and a similar condition may perhaps exist on the surface of the planets Mars and Venus, not differing much in size from cur earth. When we, however, look at the larger bodies of our planetary system, say Jupiter, which surpasses our earth in size more than 12,000 times, we find a very different condition of affairs. In the first place, its density is only one third more than that of water; while the density of our earth surpasses that of water five times. This proves from the outset that matter is on Jupiter by no means in the same condition as on our earth; that probably it has a much higher temperature of its own, so high as to keep in a gaseous condition many substances which are liquid or solid on our earth. Very recent observations with the spectroscope and telescope combined have indeed proved this to be actually the fact, and that this planet, as well as Saturn, Uranus and Neptune, possesses so high a temperature as even to shine with, besides the reflected solar light, some luminosity of their own.

If, finally, we look at the central body of our planetary system, the sun, which surpasses Jupiter in the same ratio that
Jupiter surpasses our earth, we find that the cooling process Jupiter surpasses our earth, we find that the cooling process has advanced the least; in fact, the heat of the sun is still so
great as to be entirely beyond our present means of estima great as to be entir ing temperatures.
Human life and even the historical record is short, while the changes spoken of extend over such long pariods of time as to be an eternity compared with them. No wonder, there fore, that the practical evidences are slight, so slight indeed that we should feel inclined to disbelieve such changes, and to accept a theory of perfect stability of condition. There are indeed some who adhere to this belief; but unfortunately for them, there looms up the geological record, proving stupenthem, there looms up the geological record, proving stupen-
dous changes from the time when the most excessive tropical dous changes from the time when the most excessive tropical
climate prevailed at the poles; while, between the tropics, an climate prevailed at the poles; while, between the tropics, an excessive torrid zone and boiling ocean formed an unsurpass-
able barrier for the vegetable and animal life around the poles of each hemisphere. Before that time, there was a period that the earth's temperature was so high as to occupy four times its present bulk, and to be self. ln minous. Then perhaps the moon was cooled to the tempera ture possessed now by the arth and she may have beeninhabited; a condition sim lar to that of Jupiter at the present day, where the moon may have inhabitants, though the planet itself cannot.
If these above conceptions are correct, worlds have their times of preparatory development, of youth, of manhood, and of decay. Jupiter is in its preparatory stage; our earth has passed its youth and is just entering into manhood ;our moon has had its time of decay and is now a dead planet. Thi will continue, with the difference that, after mila hese conditions will be shifted from one set of celestia bodies to another

## THE NEW MANHATTAN MARKET,

One of the largest structures in the United States is the Manhattan market, situated between 34th and 35th streets and Eleventh and Twelfth avenues in this city. Its dimen ions are 900 feet in length by 200 feet in breadth. Its foun dations rest principally on piles driven to depths varyin rom 14 to 50 feet; on these, heavy beds of concrete are laid above which, and level with the upper line of the foundation the floor is placed. This is 160,000 square feet or over thre acres and a half in extent. It consists of, first, a layer of concrete four inches, then two inches of asphalt, and final ly a coating of Portland cement, one and a half inches in thickness. The latter is to be colored in various designs and all will be impervious to water. Drainways are provided on either side of the building, through which all refuse will be carried to the river as often as the water from the 1,000 Croton hydrants is allowed to play upon it. With such a flow, it is believed that the atmosphere and the market gen erally will be kept thoroughly pure and clean.
The walls are built of Philadelphia brick and light colored Lockport) stone, the latter being used for trimming and fo portions of the ornamentation. The architectural style of the building is what is known as the Lombard. The massive ides and roof are finely symmetrical, and it is claimed tha they present some of the finest specimens of mason's and
bricklayer's work in existence. On either front, the name of bricklayer's work in existence. On either front, the name of
the structure and the date of the commencement of the work are inscribed.
From the walls rises the arch-of iron and slate-which forms the roof. The arch proper springs to an altitude of 135 feet, and extends to within 75 feet of either front. The ends of this archway are domelike in form, and the whole is covered with particolored slate, arranged in various figures and designs. The central tower of the building is 236 feet high, and will contain a clock, claimed to be the largest in the world, costing $\$ 37,000$. The other towers are two on either of the facades, and two on the center line of the sides. All are to be of similar design, and to have dials small in size compared to that on the main tower. Eight elevations, size compared to that on the main tower. Eight elevations,
constructed of iron and wood, and built along the crown of the arch, serve as ventilators. The windows are 1,500 in number and are on pivotal centers.
Between the walls and the inner line of pillars which sus tain the roof and towers, there are to be ranged between ten and twelve hundred stalls, one half for wholesale and the other for retail dealers in meats and market produce gener ally, excepting only fish, for which another building is to be constructed. The larger of these stalls will be sixteen feet square, and the smaller, ten by eleven.
In addition to the main structure, which is to be opened to the public early in August, there are to be exterior roadways and a long dock constructed. A line of river steamers are building which, when completed, will be used for the delivery of orders to the shipping in the harbor, and to various predetermined points in Brooklyn and New Jersey, between which and the offices in the main building there will be tele graph lines. In addition to this, suitable positions are to be prepared for market gardeners and produce dealers from Long Island and New Jersey
The cost of this great market enterprise, together with its docks and steamers, additional buildings, etc., is $\$ 2,000,000$. Situated in a central position, it will be the great point of supply for the entire city. The structure forms one of the most conspicuous objects in New York, and is visible up and down the river at a distance of several miles.

## SPONTANEOUS COMBUSTION.

During an investigation into the causes of a recent fire which broke out in a loaded warehouse in New York, the testimony showed that the fire originated in a case of silk
and one layer of oilcloth between the inside of the case and the goods, thus wholly excluding the airfrom thout. Th goods had evidently been packed while damp, and, there fore, the heat of the weather favored the ignition in the
manner supposed. manner supposed.
After the fire was extinguished, an effort was made to have he remainder of the goods removed from the premises, but it was not permitted. In the course of three days, fire was again discovered, and but for the promptitude and efficienc of the firemen, a heavy loss would have resulted. On inves tigation, it was discovered that this fire also originated in one of the same cases of silk twist, and was beyond question spontaneous.
The, Fire Marshal is of opinion that goods packed like the bove, no matter whether they be woolen, cotton, hemp o ilk, are liable to ignite at any time when the atmosphere avors. In this case, it was shown that the goods had be come valueless before the fire, as the process of combustion which had been going on within the case, had made the silk rotten that it could be broken with ease. It is believed that many vessels and places of business are destroyed by fire which originates in this manner.

## CANAL BOAT TOWING BY ROAD STEAMERS,

We learn from the Troy Whig that a trial of Williamson's oad engine "Enterprise" was recently made on the tow path of the Erie Canal between Albany and Port Schuyler. The machine is thirteen feet in length by seven feet wide, with n upright boiler. There is a double horizontal engine with wo cylinders, each, with a ten inch stroke, enclosed in a box There are two driving wheels five feet in diameter, the ires of which are fifteen inches wide, covered with stou india rubber and protected by iron shoes about five inche wide and set about three feet apart. The steering wheel i three feet in diameter, with a tire twelve inches in width. The seat for the engineer is directly in front of the engine, which is managed by a double crank. On either side of this seat are water tanks, and in the rear are two coal bunkers. The machine can be turned on its own ground and works much the same as a velocipede. In hight, the engine is eight fee rom the groudd to the top of the boiler. The smoke stack hinged, so as to be lowered when passing under bridges The engine is twenty-four horse power. Four boats, thre oaded and one light, were hitched to the steawer and wer propelled at the rate of about four and a quarter miles an our. The first mile was made in thirteen minutes. The Enterprise" is valued at $\$ 5,000$, and was built about three years ago. It has worked successfully on roads, and the wners are confident of its success in canal boat towing
The New York Sun remarks: "It is said that all wh witnessed the trial were fully satisfied of the practicability of this plan of steam towage, and it appears that its economical advantages are very great. The pressure of steam required to enable the engine to draw three barges is ten pounds to the square inch, and that pressure can kept up with a consumption of one hundred and fifty pounds of coal per hour. By a careful comparison of the cost of towing three boats by the road steamer and one boat by horse powe from Albany to Buffalo, in which interest, wear and tear, and all contingencies are taken into consideration, it is estimated that by the use of the road steamer the expense of towage that by the use of the road steamer the expense of towage
would be $\$ 133.86$ less for each boat than by horse power, while there would be a gain of four days in time. The usual time consumed in a trip between Buffalo and Albany is ten days the road steamer would easily make it in six.
It may be that some system of water traction may be de ised that will give even better results than these; but if not, it seems to have been fully demonstrated that the land ractor will do more than has generally been deemed possible Should it comeinto general use there can be little doubt that many improvements in its construction will be suggested by xperience, and it is also probable that improvements will e introduced in the construction of boats which will re duce the resistance of the water and lessen the wash of the onks. At all events it is safe to assume that horse powe by steam, whether land or water traction is adopted as the by steam, whether land or water
substitute for the present system.
The steamer alluded to is known as Thompson's patent, in England whereit has been brought into very extensive use, and has been subjected to the severest tests. Mr. Williamson is the owner of the patent for this country. An excellent engraving of the invention with full description will be found on page 319, Vol. XXI of the Scientific American. The capabilities of the engine for canal boat traction are there set forth. That it is well adapted to such a purpose, there can be no question.

## LOOK OUT FOR THE METEORS.

On the 10th of August, unless the calculations of our as tronomical savans fail us, the earth will pass through a ring of meteors-the remains of the comet of 1862-on which date those of our readers who are wide awake may expect a meteoric display of greater or less brilliancy. We give in another column a very interesting summary of Dr. Schellen's st tugement.
August

## BECAUSE I AM SO LAZY.

An esteemed correspondent, who is a good writer, a good nvestigator, and who knows just what is useful and interesting for readers of the Scientific American, says that the only reason why he does not more frequently contribute to our columns is "because I am so lazy." This unfortunate condition besets thousands of the most useful people in the
world, and in fact greatly hinders the mental and material pro. gress of the human race. But it can be readily overcome, in every individual case, by a determined exercise of the will We hope that our correspondent will turn over a new leaf, let us hear from him more frequently, and so set a good example to his fellow men in general and to other correspond ents of our paper in particular, who are afficted in the manner he describes.

## steamship notes.

Among the multitudinous shipping of New York harbor there is always occurring more or less of current interest from an industrial or technical standpoint. We cannot af ford room for extended mention of all or even much of this, fot some of the items are worthy of note, either as indices to commercial or engineering progress or as illustrations of the way things mechanical are sometimes managed. Of the kind last in dicated is an incident that recently occurred to the Great Western, an English bluff bowed iron freight steamer on her first trip from Bristol to New York, laden with rail road iron. She had a four bladed propeller, but broke three blades on the voyage, and steamed into Gowanus with rather dilapidated propelling machinery. She carried the usual spare propeller, and on her arrival here was taken to the Erie docks to bave it put on in the place of the old one. drill a line of holes in the boss a screw then splitit open. But in the present instance, the plan was adopted of removing in the present instance, the plan was adopted of removing
the keys, taking off the nuts, and driving it off. While doing this, the other propeller was being hoisted out of the after hold. While being swung aft, the lashings broke and the ponderous apparatus fell, one blade going through the dock and another breaking off. This left the parties with a one bladed screw on the shaft and a three bladed one in the
mud. All things considered, it was thought best to cut off mud. All things considered, it was thought best to cut off
the one blade of the former to correspond with the diminished length of the broken ones thereof, and so the vessel has started back with her jury screw. Had the affair been under Yankee management, possibly the spare screw would not have been broken, but if it had, there would have been ingenuity enough somewhere about the shop to have lengthened the broken blade with a wrought iron plate.
Nevertheless, however much we may justly claim superiority for inventive skill and adaptiveness, we have to make painful mention of British energy, slown in the progress of painful mention of British energy, sbanch of industry which we hope to see returning to our own shores. For example, the Anchor line, hitherto almost wholly devoted to freight between New York and Glasgow, is about to increase their previously limited passenger traffic by the addition of new and superior steamers. The company is now building, on the C. yde, seven new vessels which, with those now running, will aggregate forty three.
While upon the subject of steamers, we may speak of a pair of what may be termed historic marine engines, one of which is lying dismantled at the Continental Iron Works,
while the other is doing duty in the James Adger. These en while the other is doing duty in the James Adger. These engines were splendid examples of marine steam engineering,
and drove the paddlewheels of Commodore Vanderbitts far mous steam yacht the North Star, in which he royaged along the coasts of Europe a score of years ago, and which, if we remember rightly, so alarmed the officials of the port of Civita Vecchia that they ordered her off. These engines Civita Vecchia that they ordered her off. These engines
were of the vertical beam variety, of about 1,000 horse power were of the verticalbeam variety, of about 1,000 horse power
each, with sixty inch cylinders and ten feet stroke. The one each, with sixty inch cylinders and ten feet stroke. The one
at the Continental Iron Works has some of the smaller porat the Continental Iron Works has some of the smaller por-
tions missing; the bright parts are painted over, and it will tions missing; the bright parts are painted over, and it will
doubtless some time find an obscure use as a stationary modoubtless some time find an obscure use as a stationary mo-
tor. The James Adger, in which the other was placed when tor. The James Adger, in which the other was placed when
removed from the steam yacht, will be remembered as the vessel employed in laying thie first cable between Newfoundland and the mainland.
The Erie Railway is having builtat Chester, Pa.,, a new iron ferry boat, said to be the first ever designed to cross the
North river. The following are the dimensions: length beNorth river. The following are the dimensions: length be-
tween perpendiculars 180 feet, over all 190 feet. Beam over hull, 36 feet. The depth of the hold 13 feet 6 inches. The power will be furnished by a beam engine with a forty six inch cylinder and eleven feet stroke. The diameter of the paddlewheels is 22 feet and their faces 8 feet, 4 inches. The keel instead of being brought up inside the rudder to form a stern, as in the usual method of construction, is extended beyond the ends of the hull and made to form a rudder guard at each of the ends. The plates at the water line have a thickness of nine sixteenths of an inch, increased at the
bows to ten sixteenths. The vessel is to have watertight bows to ten sixteenths. The vessel is to have watertight
bulkheads up to the main deck, and is to have iron paddle beams, that is, those supporting the guards at the ends of the paddle boxes. The spring beams which support the outboard bearings or ends of the paddle shaft are also of iron The keelsons are box keelsons of heavy plate iron, arranged to distribute the weight of the engine upon the bottom. The carriage ways on deck are eleven feet in width. The bows are to be protected by extra framing as well as by the in. crease herein before referred to in the thickness of the plates. A drop return flue boiler will be punf

## bright's disease.

The medical profession generally divide this terrible dis ease of the kidneys into two forms, the acute and the chronic. The acute form is a simple congestion of the filtering tubes through which the kidneys perform their organic duty. The
tacks of congestion, granular degeneration, bringing with it structural alteration of the organ, has supervened. The first is curable; the
alleviated, is fatal.
The Nen York Times publishes some valuable statistics, extending over a period of three years, which show that the disease is more rife in certain sections of this than in other countries, especially in New York city. During the first year covered by these statistics, the ratio of deaths from Bright's disease to the total number of deaths taking place in that disease to the total number of deaths taking place in that
period was as 1 to 66 , the following year as 1 to 55 , and the period was as 1 to 6 , the following year as
third year as 1 to 42 . Comparing these figures with the raird year as 1 to 4 . Comparing these figures with the ratios in other cities, we find that in Boston it is as 1 to 93 ,
Rochester as 1 to 73 ; and in the old world, in London as 1 to Rochester as 1 to 73; and in the old world, in L
89, in Glasgow as 1 to 142 , in Paris as 1 to 266.
It is considered that the prevalence of the disease in this country is due to two leading causes, climate and intemperance. The experiments of scientific men have shown that alcohol is partly cast off from the system, unchanged, through the kidneys. When alcohol is taken to excess, the circulation in the kidneys is disturbed and irritation and congestion ensue. Wine and beer, although exercising no beneficial effect on these organs, do not tend invariably to injure.them, but rather to induce gout. Few are aware of the immense quantity of alcoholic liquors yearly consumed in New York From the 1st of May 1870 to the 30th of April 1871, 7,440 licenses were issued for the sale of intoxicating liquors, the annual fees on which amounted to $\$ 340,141.91$. Estimating the population of the city at $1,000,000$, there is one liquor saloon for every 134 inhabitants, men, women, and children. saloon for every 134 inhabitants, men, women, and children.
If all the liquor saloone in the city could be placed side If all the liquor saloone in the city could be placed side
by side they would extend a distance of 26 miles; or if situated on Broadway, they would reach the whole length of the street from the Battery to the end of the island, covering both sides of the way. Deducting the women and children who do not drink, an enormous quantity of liquor must be annually consumed by the remaining men in order to support 7,440 saloons. Whisky is the ordinary beverage drunk, and its effect on the kidneys is shown above. The records of the New York Hospital show that over fifty per cent of the cases yearly admitted for treatment were caused by intemperance in the use of alcoholic beverages.
The trying nature of our climate is another prolific cause of this disease. It has been demonstrated that the malady is confined to that part of the earth in which the change of seasons is most marked, and where the annual mean temperature of the air ranges between $46^{\circ}$ and $57^{\circ}$. In the extreme northern part of this continent, where cold is the normal condition of the atmosphere, and in the Southern States, where heat is the normal condition, the disease is but little known. In Bombay, the proportion of deaths is 1 in 2,800 ; in New Orleans it is 1 in 329, and in Providence, where cold is more prevalent than in New York, 1 in 173.
The acute form of Bright's disease may be produced by any sudden chill of the system, undue exposure, or rapid change of temperature. Unseasonable changes of garments and rapid checking of perspiration both tend to bring it on. It is also induced to a certain degree by gout or disease of the heart; one or two trades are particularly liable to it ospecially those who work in lead.
A careful study of the causes of the disease, together with the consideration by the facts advanced above, show plainly that vast numbers of persons who now suffer and die under it need never have known such an affliction. Care in seeping themselves warmly clad, avoidance of sudden chills and reckless exposure, and the observance of the simple rules of temperance, would have saved hundreds frem remature graves.

## the black rock bridge over the niagara RIVER. <br> For three years past, both American and English engineers

 ave worked to lay the foundations for the international bridge for the Grand Trunk and Great Western Railroads, at Black Rock, 4 miles below Buffalo, across the Niagara River, to Canada. The en iire length of the structure is to be 1,400 feet, consisting of iron spans resting on eight abutments. The tremendous current in the river which rushes toward the falls has rendered the work one of unexampled difficulty. Caissons and foundations have been sunk and immediately swept away by the torrent, while the river banks below are strewn with the débris of wrecks, showing a loss of millions of dollars.The entire past year has been unsuccessfully devoted to attempts to erect the three middle piers in a depth of from thirty-five to forty feet of water. Mr. Otto Meyer, of New York, who last winter was engaged to prepare and sink coffer dams, has finally, however, succeeded in sinking one dam so that the work on its enclosed pier has been com
menced. The length of this dam is 125 feet, width 32 feet, menced. The length of this dam is 125 feet, width 32 feet, and depth, to suit the river, 36 feet. It is sharp on both ends, feet wide sides, closing at the bottom,forming a space three center of the dam open for the caisson in which the pier is afterwards built. Eight of the largest anchors and chains from New York and Montreal being secured, one the 13th instant the " ship without a bottom" lay formerly moored six feet above the position of the pier to be built.
Preparations were then made for sinking several hundred tuns of stones, which were thrown in the apertures on the sides of the coffer dam until it had sunk to within eighteen inches of the river bed. A number of barrels had been arranged
previously under water and fastened on the woodwork, their buoyancy lifting the structure about two feet; these were all held by one rope, which being cut, caused the barrels to
float and submerge the coffer dam deep enough to strike the
bottom. Six very heavy iron-pointed posts or "spods," run
ning through sheaths or sockets, three on each side, were hoisted and ready to drop.
Everything being ready on shore and on board, the craf was quietly let "down stream" by ber anchors until the en gineer on shore signalled "in position." The flag was raised "all right," and with the order "cut away," the barrels floated up, the iron spods dropped, burying themselves in the river bed, and with a light shock the coffer dam rested securely on the bottom of the Niagara, on a deposit of gravel and stones. The gravel and stones have to be removed by a and stones. The gravel and stones have to be removed by a
dredge, there ready for the purpose. Below the gravel the dredge, there ready for the purpose. Below the
Three divers from the new Blackfriars Bridge, London, ara clearing away the obstructions around the shoeing. They now and then come in contact with pieces of wreck and sunken logs. Until the bridge is finished, the large steam ferry, near Buffalo, continues taking the trains across Lake Erie to the Canada landing.

## THE AMANIANS

The Amania Society is the name of a very flourishing community in Iowa, consisting of fifteen hundred members. They own everything in common, and present an admirable example of the success of the co-operative plan when intelligently administered. These people were formerly known as Ebenezers, and lived near Buffalo, N. Y., where they possessed six thousand acres of land. They sold out some fifteen years ago for the sum of five millions of dollars, and moved to Iowa. They are located near Homestead station on the Rock Island and Pacific Railroad, where they own thirty thousand acres of the choicest lands. They have seven distinct settlements, and their affairs are managed by fifteen trustees or fathers. The society is incorporated under State laws. At convenient distances in the settlements they have restaurants, to which the various families resort for food.
The Amanians cling to their good old German ways in dress and general habits, and are not in bondage to the outside world. All have an equal interest in the property; individuals are not allowed anything for their services, or furnished with money for their private use. Each settlement has a store, and all are allowed to draw a certain amount yearly from it for their private wants. A man with a family is allnwed from $\$ 50$ to $\$ 70$, with $\$ 20$ for his wife and $\$ 10$ for each child. This is expected to keep them in clothing and household furniture and supply all their little personal needs. When persons find that the amount appropriated is not sufficient for their actual expenses, the matter can be laid before the Board of Trustees, who will exercise their judgment bout making an additional appropriation.
They are a temperate, industrious, religious people, but it is difficult to define their theological views.
A leading principle of the society is that all will get along well together if every one will do right; and in this spirit, everything is managed harmoniously. There is no better theology than this, after all.
It is their custom to meet every day in small companies, about the settlement and in ronms provided for the purpose, to devote half an hour to religious exercises; on Wednesday they meet in the middle of the day; Sundays they all come together in their meeting house for religious services. They do not appear to specially favor marriage, and many of them are living single. When young people wish to marry, they generally receive the consent of the society if they have a reputation for good behavior. If the parties have not succeeded in commending themselves, they are not allowed to marry.
The society owns the whole settlement, and carries on all the business, including that of the lumber yard, store, hotel, etc. They hire considerably on the $r$ farm and in their fac tories, and claim that even in Iowa, with their 30,000 acres of choice land, farming operations do not pay. About three miles from Homestead, on the Des Moines river, they have a fine water power, flouring and woolen mills, and manufacture an extra quality of yarns and fine flannels in colors. The latter goods stand high in market, and are mostly bought up by a few first class retailers in the iarge cities. The Amanians have a high reputation for uprightness in all their dealings with the outside world, and are much respected.

## LETTER FROM PROFESSOR R. H. THURSTON.

Pittsburgh, Pa., July 2nd, 1872.
Construction of Iron Bridges. Works of the Keystone Bridge Company. Manufacture of glass ware. New iron works. The coal and iron fields. The Siemens furnace.
At the upper part of the city and near the bank of the Allegheny, are the works of the Keystone Bridge Company, where are made a large number of the finest bridges in the country, and where is now in progress the superstructure of the great St. Louis bridge over the Mississippi. About three hundred men are employed here, and an immense mount of bridge work is turned out. The character of the work done at this factory has secured for the firm a reputa-
tion that can hardly be affected by anything that we may say; tion that can hardly be affected by anything that we may say;
they are everywhere known as the builders of one of the they are everywhere known as the builders of one of the
best forms of bridges in use, and as giving the best possible best fo
work.
Many tools in use here were designed especially for their work, and are remarkable both for their ingenuity of design and for their simplicity and effectiveness.
In all the bridges built by this company from their own designs, the bolts and links are upset at their ends to take the thread or to form the eye; and this work being done
in a powerful machine at a single heat, the utmost economy of material and greatest possible strength of connections are obtained. This is one of the most noticeable peculiarities of their bridge.

## the st. LOUIS BRIDGE.

The work on the St. Louis bridge is going on finely and is well done. Every piece is carefully tested before it is put into the structure, the fits are well made and a careful in spection finally insures the rejection of any piece faulty in either construction or material. The "skewbacks" are very awkward shapes to forge and are very heavy. They are furnished by several of the larger forges of the country Those that we examined were made by Lazell, Perkins and Co., of Bridgewater, Mass, and were well executed.
manufacture of glassware.
As was remarked in an earlier letter, the glass manufac tures of Pittsburgh are very important and extensive. A large number of firms are making window glass, and the re mainder are generally making a lime glass of such excellence that it requires an expert to distinguish it from flint. It is sometimes called a flint glass, but is made without lead, which was formerly supposed indispensable in the manufac ture of a very clear glass. This lime glass lacks the weight and the metallic ring of true flint glass, but, if wel made, compares very favorably with it in other respects. We visited the establishment of W. A. Hamilton and Co. who were making druggists' prescription bottles of a good quality of lime glass, and we were much interested in watch ing the operation. The great beehive-shaped furnace, with its ten glowing pots and the forty or fifty men and boys cluster ing around it and hurrying to and fro, was a novel and enter taining spectacle. The skill displayed by the workman in taking from the liquid mass just the right quantity of melted glass upon the end of his hollow iron rod, in blowing it up to just the proper form and-size to fit the mold and the rapidity with which the work was done were equally re markable. The reheating of the necks of the bottles at the "glory hole" and nicely finishing the lip formed an appro priate side show.
A large proportion of the furnaces are now blown out for repairs. This requires some weeks, and the furnaces being ebuilt, their fires are lighted and are not extinguished unti another year brings around again the season for repairs.
The O'Hara Glass Works, conducted by Messrs Jas. B Lyon and Co., were formerly noted as the makers of the best flint glass manufactured in this country. They are now making a lime glass and are sustaining their reputation by the excellence of the new product. These were among the established by General Jas. O'Hara and Major Isaac Craig, in ${ }^{17} 795$, first making window glass. They began making flin glass in 1802. They have made their reputation, and ar sustaining it, like the best iron masters of the place, by steady attention to the choice of the best materials and by doing he best possible work upon them, and then by a thorough ystem of inspection which prevents any, except perfectly satisfactory products, going into the market. Some of the cut ware made here is very beautiful. This work is done by grinding, the work being held in the hand of the workman; and the skill displayed in cutting the most delicate patterns is frequently perfectly marvelous, and appears the more astonishing when it is noticed that the work is done by no more elaborate apparatus than a little metal wheel, runnin witl emery as the cutting material.
The molds in which the pressed articles are formed are quite remarkable specimens of metal work. They are cast frequently in several pieces in order that the article may be withdrawn from them when made, and the ingenuity dis layed in concealing the joints, and the patience and th skill exhibited in giving their inner surface a perfection of polish, are equally notable.

COAL AND IRON DEPOSITS.
An excursion up the Monongahela to McKeesport, where a Boston firm are erecting extensive works in which to make river scenery above Pittsburgh, and some of it was very pic turesque, and also to explore one of the coal mines from which comes the Pittsburgh coal. The deposits are usually several feet deep in thickness-averaging perhaps four feet ble hight above the river level. The mining is easily and ely carried on, the veing being of hood hight and and
 ooms having a good floor and roof. The coal is loaded into care where the bed outcrops on the river bank, and is let down inclined planes and dumped directly into the boats and barges which carry it down to the city or to ports lower
down the river. It would be difficult to imagine how Nature could have more conveniently arranged these great deposits for the use of man. None of the expense and danger is in curred here, that attends the sinking of deep shafts and the hoisting of coal to the surface that is generally necessary elsewhere, and there is comparatively little expense for ransportation where, as here, the coal is dug from the rive bank itself.
There are 15,000 square miles of these coal fields; $\$ 15,000$, 000 of Pittsburgh capital is invested in mining and probably $\$ 25,000,000$ in transportation, while the total of all interests dependent upon these coal fields cannot fall short of the normous gum of $\$ 100,000,000$
Neither time nor space will admit of a description of our isit to the mill of Schoenberger and Blair, where we saw the best iron sponge-made directly from the ore by Mr. Blair's process-that we have seen anywhere, or to the Superior
Mills, where we found probably the best arranged iron rail ing, where we found probably
ing in the United States,

We cannot describe the Siemens furnac uch com describe the Siemens furnace that we saw in el use where high temperatare or aconomy of was desired, nor even refer to the beautiful application, which the inventor has made in it, of well recognized scienific principles and of as well known practical engineering facts; and we must even omit a description of what we saw t the Allegheny observatory, where Professor S. P. Langley has arranged for the regulation of the time of the great Pennsylvania railroad and its branches by electrical clocks connected with his own standard at the observatory-the widest "distribution of time" in the world already, and in fair way to be much further extended by the energetic fair way to be much further extended by the energetic our visit were quite insufficient to satisfy our desire to thor oughly explore even a small number of the numerous interesting engineering establishments, or to witness the many at ractive sights about this great human beehive. We must leave all until our good fortune shall offer an opportunity to revisit this place, and hurry westward and northwestward to see where the iron ores generally used here are obtained and how they are mined, and to see some of the great de posits of copper which feed our narkets.
R. H. T.

## SCIENTIFIC AND PRACTICAL INFORMATIOK.

## FIREWEED FIBER.

A plant, yielding a fiber capable of being spun and woven, called the epitobium or fireweed, has lately attracted the at ention of manufacturers. It is very similar to the cotton plant, but the seeds are smaller and no ginning is required separate them from the boll. Wicks, ropes, yarn, and ven paper have been made from it, the last named applica ion being especially successful, the product almost equaling he silk-made paper of China and Japan. The most valuale characteristic of this plant is stated to be that it will row in any soil, and it is said to have appeared spontane usly in evergreen covered lands which have been burnt over.

## PREPARATION OF SILK.

Silk in its raw state, as spun by the worm, is either white or yellow, of various shades, and is covered with a varnish which gives it a stiffness and a degree of elasticity. For the reater number of purposes to which silk is applied, it must be deprived of this native covering, which has been long con sidered to be a sort of gum. The operation by which this coloring matter is removed is called scouring, cleansing, or boiling. Nothing agrees so well with the nature of silk and preserves its brilliancy and suppleness so perfectly, so far as uropean experience goes, as a rapid boil with soap and wa ter. It appears, however, that the Chinese do not employ this method, but something that is preferable. Possibly the uperior beauty of their white silk may be owing to the su eriority of the raw material.
To produce the China white, a little annatto is mixed with he soap water, so atrong as to lather by agitation, and the silk is passed through it. As to the other shades, they have only to be azured more or less with a fine indigo, previously washed in hot water and reduced to powder. After being hithdrawn from the bath, the silk is introduced into the sul phuring chamber, if it is to be made use of in the white state The silks intended for the manufacture of blondes and gauzes are not subjected to the ordinary scouring process, because it essential in these cases for them to present their natura tiffness. For these the manufaeturer selects the raw silk of China, or the whitest raw silk of other countries, which are teeped and then rinsed in a bath of pure water, wrung and exposed to the vapor of water, and then passed through the azure water.
The dull silks, says the British Trade Journal, in which the varnish has already undergone some alteration, never ac quire a fine white, unless they areexposed to snlphuric acid gas. Exposure to light has also a very greateffect in whiten ng silks, and is had recourse to, it is said, with advantage by the Chinese. The Chinese prepare their silk with a species of white beans, with some wheat flour, common salt, and water in the respective proportions of $5,5,6$, and 25 . It is difficult to discover what chemical action can occur between he decoction and the varnish of raw silk; possibly some acid may be developed which may soften the gummy matter an facilitate its separation.
A railwar tunnel under the Mississippi river at Memphis, Tenn., is projected, to cost five millions of dollars.
A cubic foot of air weighs 523 grains. A cubic foot of water weighs 1,000 ounces.
The Popolar Soirnce monthly, No. 4, for August, contains a variet interesting scientific articles, collated principally from foreign magazines
 Profassor E . L. Youmans, is well known as a lover of science, and as an in
defatig bie worker in the promulgation of useful knowledge.
Facts for the Ladies, -Miss H. W. Terry, Wading River, N.Y., ha sed her Wheeler \& Wilson Lock-Stitch Machine almost constantly for
years, on all kinds of family sewing, and broken but one needle. See the ew Improvements and Woods' Lock-Stitch Ripper

## Busiuts mud 2exsomal.

The Charge far Insertian under this head is One Dollar a Line. If the Notics
exiceed Four Eines, ane Dollar and a Half per Line will be charged.
The paper that meets the eye of manufacturers throughou Cheap Engines for Sale by Brady \& Logan. See page 93. In the Wakefield Earth Closet are combined Health, Cleanli-

Callow's New process of Graining Oak, Walnut, Chestnut Rosewood, \&c., with Metallic Therom Graining Tools, patented July 1
1870; does triple quick work, first class imitations, is durable, and make every man his own Grainer. Address, with stamp,J.J. Callow,Cleveland, $O$ Forty-five horse Engine, Lathes, Drills, three inch Shafting with assorted Pulleys, and other iron working Machinery and Tools, in
Brick 4 story Factory, for sale low with and water distance from New York. Address Box 1,203 , New York.
Lenoir Gas Engine-Wanted, the address of any agent in this country of the Lenoir Gas Engine, or of any person who has one
imported within two or three years. Address, F. R., Box 498, New port, R. I.
Platina Plating—Alb. Lovie, 729 N. 3d St., Philadelphia, Pa Gear, Wheels, for Models; also Springs, Screws, Brass Tube Sheet Brass, Steel, \&c. Illnstrated P
Wightman, 23 Cornhill, Boston, Mass.
Brick and Mortar Elevator and Distributor-Patent for Sale See description in Sot. Amrrioan, July 20, 1872. T. Shanks, Lombard an Sharp Streets, Baltimore, Md
The Berryman Manf. Co. make a specialty of the economica reeding and safety in working steam Bollers. Adaress I. B. Davis \& Co Hartford, Conn.
The Berryman Heater and Regulator for Steam Boilers-No. one using Steam Boilers can afford to be without them. I. B. Davis \& Co Hartford, Conn.
Wanted-An Engine Belt 76 ft . long, 19 inches wide; either new or second hand. Address P. O. Box, No. 237, Buffalo, N.Y.
Wanted-Two good machinists used to Lathe, Planer, and Bench work. Steady employment and good pay for the right men. Ad dress, stating terms, age, \&c., Oneida Community, N. Y.
Wanted-Melter. Permanent situation, at good wages, to a good, experienced Iron Melter. Address C.. Iron Founder, Cleveland, 0 Tested Machinery Oils-Kelley's Patent Sperm Oil, $\$ 1$ gallon; Engine Oil, 75 cts. ; Filtered Rock Lub
tificates. 116 Maiden Lane, New York.
Kelley's Chemical Metallic Paints, $\$ 1, \$ 1 \cdot 50$, $\$ 2$ per gallon, mized ready for use. Send for cards of colors, \&c., 116 Maiden Lane,N. Y. Kelley's Pat.Petroleum Linseed Oil, 50c.gal., 116 Maiden Lane econd hand Saws and Mandril for Sale—one 46 inches diam eter, used six weeks in cutting Georgia Pine Flooring-one 52 inche never been used. H. A. Crane, foot W. 30th St., New York.
Brown's Coalyard Quarry \& Contractors' Apparatus for hoisting is better to purchase one of the American Twist Drill Company' New Style Testing Machines-Patented Scales. Send fo New Illustrated Catalogue. Riehle Brothers, 9th and Coates Streets Phil
Flouring Mill near St. Louis, Mo., for Sale. See back page. State Rights on improved Cigar Moulds for Sale. Patented June 25. 1872. Inquire of Isaac Guthman, Morrison. White Side Co., Ill For Machinists' Tools and Supplies of every description, address Kelly, Howell \& Ludwig, 917 Market Street, Philadelphis, Pa. For 2, 4, 6 \& 8 H.P. Engines,address Twiss Bro.,New Haven,Ct Peck's Patent Drop Press. Milo Peck \& Co., New Haven, Ct The best recipes on all subjects in the National Recipe Book
Post pald, \$2.00. Michigan Pubishing Company, Baing, Wrecking, Pumping, Drainage, or Irrigating Machin ers, for sale or rent. See advertisement. Andrew's Patent, inside pare. We will Remove and Prevent Scale in any Steam Boiler or make no Charge. Two Valuable Patents for Sale. Geo. W.Lord,Phila., Pa For Hydraulic Jacks and Presses, New or Second Hand, send for circular to E. Lyon, 470 Grand Street, New York
n inducement.-Free Rent for three months to tenants with good business, in commodious factory just built for encouragemen power elevator, \&c. \&c. Manufacturers' Corporate Association, West field, Mass. Plans of Building, Room 22, Twenty One Park Row, N. Y.
For Marble Floor Tile, address G. Barney, Swanton, Vt
Old Furniture Factory for Sale. A. B., care Jones Scale Works, Binghamton, N. Y.
Walrus Leather for Polishing Steel, Brass, and Plated Ware. Greene, Tweed \& Co., 18 Park Place, New York.
Pattern Letters and Figures, to put on patterns, for molding names, places and dates on castings, etc. H. W.Knight, Seneca Falls, N.Y teel Castings to pattern, strong: and tough. Can be forged and tempered. Address Collins \& Co., 212 Water Street, New York Presses, Dies, and Tinners' Tools. Conor \& Mays, late Mays \& Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. Y. Portable Baths. Address Portable Bath Co., Sag Harbor, N.Y Extra Heavy Oak tanned Belting-Rubber Belting, Packing, Hose, \&c. Greene, Tweed \& Co., 18 Park Place, New York.
all kinds of Presses and Dies. Bliss \& Williams, successors Diamond Carbon,of all sizes and shapes, furnished for drilling rock, sawing stone, and turning emery wheels or other hard substances
alos Glazier's Diamonds, by John Dickinson, 64 Nassau st., New York. For Steam Fire Engines, address R. J. Gould, Newark, N. J. Williamson's Road Steamer and Steam Plow, with Rubber Tires. Address D. D. Wil
Belting as is Belting-Best Philadelphia Oak Tanned. C. W Arny, 901 and 303 Cherry Street, Philadelphia, Pa
Boynton's Lightning Saws. The genuine $\$ 500$ challenge. Will cut five times as fast as an ax. A 6 foot cross cut and buck sam, gs. E. M. Boyton, Better than the Best-Davis' Patent Recording Steam Gauge Simple and Cheap. New York Steam Gauge Co,, 46 Cortlandt St., N. Y.
For Solid Wrought-iron Beams, etc., see advertisement. Ad dress Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.
For hand fire engines,address Rumsey \& Co.,Seneca Falls,N.Y To Ascertain where there will be a demand for new Machinery, mechanics, or manaiacturars' sapplies, see Manafacturing
United States in Boston Commercial Bulletin. Terms $\$ 4.00$ year.

To Excel in Improvement is the leading element of this country the sewing machine in rapid strides of improvement. Among them the
New wilson Under-Feed Machine may be counted the leading one in this onnection. Mr. W. G. Wilson, its inventor, and President of the Com pany that manufactures it, makes its improvement his constant study verything has been added to it that constant experimenting and scienc amily use. Light, rapid, beautiful, durable and perfect, the Wilson hold
he leading place among the best sewing machines in use. Salesroom, 70 the leading place among the best sewing machines in use. Salesroom, 707
Broadway, New York; also for saie in all other cities in the United States,

## Motarsqqumpies.

[We present herevoith a series of inquiries embracing a variety of topics of
reater or less general interest. The questions are simple, it is true, but we reater or less general interest. The questions are
prefer to elicit practical answers from our readers.
1.-Fly Paper.-Will any one give me a recipe for making , paper that, if files alight uponit, they stick to it?-T. W. So
2.-Strength of Citric Acid.-How much citric acid uals one dozen lemons?-T. W. S
3.-Patent Leather.-What composition is used for in leather, and how is it put on?-S. B. D.
4.-White India Rubber.-Is there any way in which ndia rubb

- M. H. J.
5.-Wire for Sieves.-What kind of a wire sieve wil withstand the action of salt and guano? Iron sieves or wire will do only for a few days; then they are rusted out and worthless.-A. C .

6. -TeETH IN Wheels for Chain Belts.-Will some on inform me of a rule for laying out or spacing off teeth in wheels for chain belts to run on? Different wheels require different spacing for the same
7.-Grinding Lenses.-I wish to make a powerful lens for a microscope. The one $I$ have is not strong enough. Can some one tell
8.-Centering Lathes.-How can the conical points of the centers of iathe arbors be ground so that their cross sections shall not
vary from circles by morethan one ten thousandth part of an inch?-G.M.T.
9.-Japanese Paper Ware.-Can any one tell me how is is made, or put me in the direction to acquire the information?-E.A.W
10.-Permanent Aniline Ink.-Can I make permanent nk from aniline colors? I dissolved rosaniline in alcohol, and to get the
proper tint, I mixed it with water and gum arabic. It is a splendid ink, bu proper tint, I mixed it with water and gu
after a time it fades and washes a way.-
11.-Anatomical Specimens.-How can I prepare anato mical specimens
dried.-G. $\mathbf{H} . \mathrm{J}$.
12.-Compressibility of Water.-Supposing you put water under a pressure of one, two, or three atmospheres; in what propor-
tion does the volume of the water decrease and the specific gravity increase? tion doe
13.-Magnetic Currents.-Will Mr. John Wise the aero naut, or some other experienced philosopher, inform me whether there is
any perceptible variation in the line of magnetio currents, when we rise
14.-Impure Water.-Owing to the continued drought, the water in the storage lakes supplying our city has become verymuch re-
duced, and the water now has an unpleasant taste and smell. What can be
15.-Refrigerators.-Can any one give me general in formation as to refrigerators? I want to make one on a small scale for
family use, and would like to know the materials used and their cost. Would family use, and would like to know the materials used and their cost. Would
the money required to build an ice house and the labor spent in flling it be as well laid out in a refrigerator?-W. A.
16.-Engine for Gang Plows.-Could not an engine be built of small power with elevating screws for the boiler, to keep it on a level, and so enable it two or more plows in gang?-A. J. D.
17.-Power for Steam Yacht.-I am about to build a screw propeller steam yacht, 30 feet long by 10 feet beam. What is the smallest single engine that can be used to run it 15 miles per hour? What ought
the diameter of the screw to be, and how many revolutions ought it to make per minute?-W. S. B.
18.-Drying Fruit.-Can the heat of the sun be stored up to be used during the night? One of the great wants of the West is a cheap
and convenient method of drying fruit. Could the sun's and the waste heat and convenient method of drying fruit. Could the sun's and the waste heat
from the cooking stove be so stored that little fuel would be required?E.E.S.
19.-Coffee Used in Dyeing.-I saw a statement some time ago in a paper (now mislaid) that a large quantity of coffee was used
in the process of dyeing; it was submitted to a hot bath by which certain properties were extracted, then dried and sold for food. Please inform me
20.-Fetid Water.-The water in my cistern has a very isagreeable odor; what can $I$ do to remedy it? On standing a few hours in an open vessel, a scum rises to the top resembling iron rust in color. The
cisternis new and so set as to receive no surface water; the roof is also cisternis new and so set as to receive no surface water; the roof is also
new and is not shaded by trees. Three ordinary iron pumpswhich are used constantly are attached. The top is kept covered.-F.D. H.
21.-Tinning Iron.-Can any one, familiarwith processes or tinning iron, tell me if glycerin will do for dissolving sal ammoniac or
muriatic acid, sothat the articles when properly cleaned can be dipped from this preparation into the melted tin? I have used a solution of sal ammoniac in diluted muriatic actid, and dipped the articles in powdered rosin before dipping into the tin. I have also used melted tallow instead of owdered rosin, but I wish to use something which is easy to removefrom the articles after
plate.-W. S. H.
22.-Priming of Boilers.-I have a boiler ten feet long with 40 two inch flues and a steam dome on top; the engine is estimated at 50 pounds, the water gushes out at th: Can you explain to me the trouble? I contend that the pipe from the en-
gine is too long; it is 12 teet, and consequently I think it gives room for the gine is too long; it is 12 teet, an
steam to condense. -s . M. P.
23.-Red Ants.-In your issue of July 20 is an item informing the public that red ants throw out a liquid substance from their bodies. Now tell us, gentlemen, how we can throw out the red ants alto-
gether from our cupboards. Hov shall we be rid of the red ants themselves? gether from our cupboards. Hov shall we be rid of the red ants themselves?
Salt has been said to be an antidote, but a trial of it proves that salt don't

## Bmavers id Correspondents.

## SPEIALL NOTE.-TAB column ts destignea for the general interest and in-


when pata for
and Persona.
Madras Water Woris.-J. S. L.'s Madras Athenoum has not come to han
A Shower of Pollen.-A. V. P., of Mich., says: We had a heavy shower yesterday, and with the rain there fell a large quantity of the yellow powder, a specimen of which I enclose. The impression here
is that it is sulphur. One person claims that it is the sulphur that would have been burnt up had the cloud been accompanied by lightning. I have tried to burn it, but it does not burn; therefore I conclude that it is not
sulphur. Thinking you might be fnterested I send a sample. Answer: sulphur. Thinking you might be interested, I send a sample. Answer The substance sent is the pollen or a species of pine. A representation o the particles as they look under the microscope may be seen in Wood'
"Botany," page 103, Fig. 367. Showers of pollen and infusoria are not un common, and are always interesting phenomena. The dally papers recently reported the fallof a shower of yellow sulphyeat Saratoga Spring durit $g$ a rain. But it was prohably pollen, as aboye.
Mineral Specimen.-Enclosed I send you a stone, or
something else found among handreds of others in a small stream of
water. They are not all alfke. It is very hard indeed. Is it of any value? Answer: The specimen is a quartz pebble. No stone which will yield to the file and grindstone can be diamond. Quartz pebbles, whe
Utah Obsidian.-I see a little notice on the African dia mond fields. Please tell me whether, in those fields, Mr. Paterson ha
seen multitudes of the dark colored stones of which I send you herewith specimen. When I found them (on topground like gravel, and plentifal), thought of Brazilian diamond fields. I have also seen them on marly soil
and metamorphous clay slate shales and green sandstone, mixed wit and metamorphous clay slate shales and green sandstone, muxed with
blendish formations of all colors. I had no time to lose, or I would have blendish formations of all colors. I had no time to lose, or I would have
spent' a week to dig and wash the marly ground. spent a week to dig and wash the marly ground. Bat if there be such
stones in the African regions, I have every reason to believe I found similar fields here in Utah. - - . Answer: The specimens sent are of volcant origin. The black is obsidian or black ploss lava, which often occurs in
nodules in river sand in Mexico and elsewhere. The other is a known vanodules in river sand in Mexico and elsewhere. The other is a known va riety. They are interesting to the mineralogist, and are sometimes used
for Jewelry, but they have an indifferent value. We were not aware that for jewelry, but they have an indifferent value. We were n
Mr. Paterson found obsidian in the African diamond felds.
Steam and Compressed Air.-To C. B. B.-Compressed air may be used in place of steam to work an engine
Heating Feed Water for Locomotives.-To A. M.-Sev eral devices have been employed for the pu
which would be most suitable for your engine.
oiler Scale, etc.-S. M. P. should consult our advertis ing columns. As an "Engineeer's Guide," Bourne's "Catechism of th
Steam Engine" is a good authority, and may be studled by beginners. tag Horn Beetle.-I send you a horned bug for inspec tion, as I see, by the Soirntifio Amerionn, that you write a chapter on such things occasionally. These bugs are numerous towards night.-J.
F. W. Answer: The bug is the stag horn beetle or tucanus dama. It arva or caterpillar has a rusty colored head, and lives in rotte
A. H. C., of Conn., sends some mineral specimens, requesting to know their character. We reply: The golden spangles in the quart
rock are pyrites. The black specimen appears to be tourmaline, but the fragment is too small for safe determination.
Solid and Hollow Iron Shafts.-Which would sustain the greater weight, a solid cylinder of iron two inches in diameter an inch internal diameter of the same length? Each is supposed to rest horizontally, supported at the ends, and the weight rests upon, or is sus. pended from, the middle of each cylinder.- S . S . Answer:'Assuming that average castiron be the material employed, the quiescent breaking load of a solid cylinder of the specified dimensions would be about 5,040
while that of a hollow cylinder would hardly exceed 3,908 pounds. L. S. F., of O.-The issue of June 22d closed the volume 26 numbers commencing January 1st. The next issue was dated July 6 , Rinting Ques paper being issued.
rinting Questions.-To M. W. Z.-Twe of your questions correspondents. Every could not be defnitely answered by us or our prices vary considerably. Pay a fair price to a reputable manufacturer and stick to him as long as he sends you the right thing.
qudaridm Cement.-R. C., of Ill., will find a good recipe on

${ }^{10}$Metal Lining in Cast Iron Boxes.Let W. A., query 12, on page 41 drill a few holes at an angle on the inside of his
boxes, partially through the metal. The melted babes, partially through the metal. The melted place and be tight until worn out.- S . G. S., of N. Y.
Taking Impressions on Paper.-Query 19, page 10.-Impressions can be taken by coating a plece of thick paper with oll and
olding $t$ over the flame of a candle or lamp until it is smoked black. Any kind of oil will answer, though linseed is the best; little oil should Force of Falining Bodies.-In view of the difference between the two answers to J. E., query 12, June 8, and of my own ideas,
somewhat different from either, I would say: The striking force of a moring body, in whatever direction it move say: The strintum. Its mome tum is the joint result of its quantity of matter and its velocity. The ratio of this momentam to that of other moving bodies is compounded of the ratio of its quantity of matter, which is indicated by its weight, and
of its velocity at the instant in question. Its momentum, therefore, is not weight any more than it is space or time, and it cannot be expressed by pounds, in the ordinary sense of that word, any more than by feet or by seconds, nor is it expressed by any two of those terms. To obtain a statement of the momentum of a body for the parpose of comparison:
Multiplv its weight by its velocity-its number of pounds, for instance, Multiplvits weight by its velocity-its number of pounds, for instance,
by the number of feet it would move in a second if it should proceed for a second at the rate for the instant in question. The velocity of a falling body is continually accelerated, and it increases not as the space fallen over but as the square root (query? ED.) of that space. Therefore to multiply the weight by the space fallen over will not give the momentum. The velocity of a falling body at the end of one second of its fall is $321-8$ feet per sec
ond, and it has fallen one half that distance. It will fall $41-48$ feet in half a second, and its velocity is then $81-24$ feet in half a second. The velocity at four feet descent is nearly the same, but more exactly is 16.0312 feet per second. This multiplied by the weight in pounds gives the momentum. The general formula is: The square root of ( $64 \cdot 38$ multiplied by the distance fallen)-the velocity, and the velocity maltiplied by the weight=the
momentum. So mach for determining the momentum. The extent of change produced by the blow of a hammer has a compound relation to the force of the blow and the ability of that which it strikes to resist. Some obstacle resist in proportion not only to intrinsie power, but also to the time dur ing which they exert then rointance, and their resistance to a blow less as the velocity of the blow is greater. Such are the different at
tractive, rapulelve, and expansive forces, and such is substantiall tractive, repulilve, and expansive forces, and such is substantially th
case where springs are to be bent and where many forms of cohesion a
to be overcome. In such cases, the change produced is as the weight mul-
tiplied by the square of the velocity, and in case of a falling body is as the weight multiplied by the distance fallen. Other resistances are indepen dent of time, and are in proportion to the space over which the resistance operates. Such is substantially the case of friction. Here the change is as
the momentum of the blow. It is so in the case of bodies resisted by the the momentum of the blow. It is so in the case of bodies resisted by the momentum or inertia of other bodies,or, as in greater or less degree is the
case of a body moving through liquids, of the particles of bodies. The case of forging with a hammer presents a compound of both these kinds ofresistance, varying in their proportions with the nature of materials,

Fecent Antricau amd foreign emtents. nder the ts heading we shall publish weekly notes of some of the more promi.
nent home and foreign patents.
abgand Lamp burner.-Joseph Ravoux, of New York city, assignor to dimself and Lucien Knapp, of same place.-This invention relates to imare adapted for the reception of annular wicks, and lamp burners which improve the fame by a more perfect system of admission of air. It con-
sists in admitting air at the base of the fiam of sists in admitting air at the base of the flame of an argand burner by
means of perforations in the concentric tubes which enclose the wick. The means of perforations in the concentric tubes which enclose the wick. The
npper ends of the tubes are bent apart-the inner one inward and the outer apper ends of the tubes are bent apart-the in
Bird's Nesst,-John A. Deknatel, New York city.-This invertion furnishes an improved wooden bird nest which is made in two pieces, each
turned out of a single piece of wood, and japanned both inside and outside Paintrr's Paletite.-The improvement in this invention consists in Painter's Palettr. - The improvement in this invention consists in
adjustably attaching to the palette a clamp, by means of which it can be attached to any sultable fixture and thereby rendered more useful in sign and ornamental painting. It may be used without the clamp, in the usual
manner. Oscar Le Roy Andrews, of Boston, Mass., is the inventor of this manner. Osca
mprovement.
Cell Cover for Sewing Maditine Table.-George Alfred Wheeler, Worcester, Mass.-This invention consists in arranging a series of cells, in
sewing machine or other tables, in a row, and providing them with sliding covers which adjoin and all slide in the same direction when being opened or closed. A spring acts on one end cover, and through that communicates A
Automatio bill Rinetiva Apparatus for Locomotives.-James S. Lamar, Augusta, Ga.-This invention consists of a crank shaft which is ounted on the locomotive and provided with a friction wheel or a gea
Wheel in such a manner that it can be readily geared or ungeared with one of the axles. The bell is connected to the crank by a cord and is rung automatically when the locomotive is in motion; thus saving the labor of ring.
ing it by hand, which is considerable in large towns where the distances ing it by hand, which is considerable in large towns
along which the bell is required to be rung are long.
SAW GUide.-James Arthur, Anoka, Minn.-This invention produces saw guide which can have itst jaws adjusted while the saw is in operation
withont exposing the operator's hands to dangerous contact with it, and in Which, turthermore, either jaw can be adjusted independently of the other Wherl Plow.-Guy Tozer, Jackson, Mo.-This invention furnishes an Whried plow which is designed more particularly tor tight clay soils, but which may be used with advantage in other solls. It is so constructed as to open the bottom of the furrow so as to drain off surplus water from the
roots of the grain and prevent them being ehilled by it in cold weather or oots of the grain
calded in warm.
Rotary Stixam. Enaine - George H. Whitcher, South Brooklyn, N.Y.to invention furn pump, if desired; it consists in combining two steam cylinders with two other smaller cylinders eccentrically shafted within them, and a horizonta piston. The construction, which would not be understood from a verbal
explanation alone, insures the rotation of the inner cylinders and their explanation alone, insures the
hafts when steam is admitted.
Portable Hodse.-Harvey W. Forman, Centralia, Kan.-The invention order to admit of being packed and transported conveniently and chapil om one place to another. It consists in a new arrangement of parts with view to increased lightness, strength and durability of the structure.
Hatchway Guads.-Edward H. Ball, of New York city.-This inventio Hatceway Guards.-Edward H. Ball, of New York city.-This invention arnishes an improved guard for elevator and other hatchways which 18 so
constructed as to be raised by weights automatically into position as the constructed as to be raised by weights automatically into position as the
hatch is opened. When shut down, it is secured in place by a spring boit hatch is opened. When shut down, it
which is released by the rising hatch.
Liftina Jaci.-Charles Maynard, ot North Topeka, Kas. - The object o his invention is to render more useful and effective the ordinary lifting jack or wagons and other wheeled vehicles; and it eonsists in connecting the parts so as to cheapen, simplify, and impro
volving any material alteration in form.
Heddid Conneotion for Looms.-Thomas K. McIntyre, of Warner, n. - In this invention, metal straps are used for connecting the various parts $i$ looms instead of the ordinary leather ones. They are cheaper and more
urable. The strap is made in two toothed pieces which are joined by a eeve which is drawn over the parts where the teeth mesh. By this con ruction its length is easily adjustable.
MILi STRainfr.-Richara G. Kendall, of Fairweather, Ill.-This invention
elates to a aseful improvement in milk straining buckets or pails, and con sists in a new mode of making the strainers detachable from the bucket, so that they may be changed or removed with facility. The strainers are mad Frxoz.-Israel L. Landis, Lancaster, Pa.-This invention is an improve in combining, with the pins that pass horizontally through the posts and sup port the panels in an upright position, other pins that pass transversely hrough bottom strips of the panels and prevent the panels being raised by mall stock in its eff ort to pass under the same.
Frutr Dryer.-Judson Allen, of Everett, Mo.-In this improved.dryer an
air chamber is arranged below the drying air chamber is arranged below the drying chamber and above the heating
chamber.which receives air from the sides of the case, and delivers it through thamber.which receives air from the sides of the case, and delivers it through
its perforated vertical side walls to the drying chamber above, so as to prevent too much heat radiating through the bottom plate. At each corner of the dryer is a hot air conductor, which can be adjusted either to turn the heatinto the dryer, or to allow it to escape through the top. On the front of each conductor are deflecting plates which cause an equal distribution of Meda
Medical Compound for Heart Disiase. - Michael D. Britten, of Eaton,
Mich. This invention relates to a new and useful improvement in the cura Mich.-This invention relates to a new and useful improvement in the cura-
tive art; and consists in a compound composed of the pitch of pinus origide beech bark and the heart of the iron-woad tree, all steeped in alcohol moderately for several hours.
Fruit Crate.-Elijah B. Georgia, Clifton Station, Va.-The invention consists in a fruit and vegetable crate consisting of top a
ted and connected by slats nailed to their inner sides.
Adrestable Stand.-Matthews Stahn, Baltimore, Md.-This invention oonsists in a triangular stand for photographer's use, formed in two hollow
sections, one of which is raised or lowered within the other by means of a windlass, and held by clamp screws.
Water Wikel.-John Frank, Chester, O. The invention consists in adjusting a water wheel vertically bedge support; in attaching the buckets by mortise and tenon to a central hub and then holding it by a single band and a bolt to each bucket; in giving a gradual curve, then a quiek rise at the
ond, and then a relative hight and width to the buckets; and finally, in end. and then a relative hight and width to the buckets; and finally, in
making the cup in sections, detachably held by cross rods on the inside and makig on the outside.
 nimsilf and Alibert V. D. D. Coller, of same place. This Invention furnishes
an improved cultivator, which is so constructed that tit may be convenient. ly transported from place to place. It 1s provided with wheels which
stand a litte above the surface of the ground wheu in workling position and by the ald of which $1 t$ ts moved over obstructions. The frame also ad
 Drafr Rradiator.-Joseph Woodruff, of Rahway, N. J.-Th1s invention relates to a new apparatus for regulating the draft of the furnace in accor-
dance with the steam pressure of a boller, so that the furnace keat is automatically reduced whenever the pressure exceede a given degfee, and ts augmented when the pressure falls below a desired polnt. It conalats in an arrangement of flexible dappragms, connected with a vertical stom, which
when adjusted up and down by the action of steam on the diaphragms when adjusted up and down, by the action of steam on the dapphragms,

Bratd Guide for Sawiva Machivs.-Eddy T. Thomas, of boston, Mass slot in the presser foot, of a cyllindical guide piece a circumferential $V$-shaped groove and adapted to be turned or rotated on Its axis, so that the e passage for the braid may be
width to accommodate wide or narrow braids.
Aninal Trap.-George F. Lampkin, of Georgetown, Ky., assignor to nimsels and James Y . Kelley, of same pacee.-This invention furnishes a as to catch any number of animals without trightening the others, or leav ng any scent in the trap to warn them of the danger.
BeD Borrox.-Henry B. Ramsey, of Rockville, Ind., sasignor to himsel
and Wells C. Mccool, of Guthrie center, Iowa.- Thais invention relates to a new arrangementor the supporting springe and cross bars of a bed bot tom. The slats are, by serews or nalls, मrmis secured to the cross bars,
and strips of leather or rubber are interposed between them to prevent Wear ana sque.
der side, the
profect downw
 ed withrubber or leather. In order to strengthen the spring and give a
more frm support to the cross bara, cuabions of rubber, or spiral springs, more firm support t to
are placed between.
Gratri.-Josiah A. Hard, of Lawrence, Kanas., -This invention relatee consists in the use of a rotary grating cylinder contained within a station ary cylluder, and hung on a frame in sich a manner that it can be with
drawn from the outer cylinder and detached from the frame whenever de drawn from the outer cyllinder and detached from the frame whenever de

Ratcoift.-Thomas Searls, of Pottstown, Pa.-This inverion an improved ratchet, which is 80 constructed that it may be readill adjast ed to revolve the shaft in either direction, or to let the shaft stand still
while the ratchet continues to work. It consists in a toothed wheel which 18 sttached to the shaft, and two pawls which are placed on opposite 8idees
 Ohher approprrate mechanism, thepawls, or elther of then, are made to en
gage with the wheel or not, as reauired. Brior Macitins.-Henry Bulmer and Charies sheppara, of Montreal Canada. -This invention relates to an attachment to brick machines, by
the operation of which the clay 18 pressed 1 nto the mold at suitable press ure and themolds, whenflled, are pushed our from below the drum with out manaul labor. The machine may be worked by ytean, water, or horse
power, and will, with the same attendance, manufactura a greater number power, and will, with the same attendance, manufacture a
of bricks than the deviceesfor the same purpose now in use.
 smith, of Tough Kenamon,pPa.-This invention relates to a new machin
for throating the spokes of $w a g o n$ or carrige wheels, faciog the same, and Yor throating the spokes of wagon or carriage wheels, faclig the same, an
tapering them toward the outer ends. It consists in the arrangement o an eccentric support for the spoke while tn contact with the cutter, Bo that
the cut may be tapering to make the spoke thinner on the faee than at the the cut may ye tapering so make the spose thinner on the faee than at the
back. The ninvention farther comblines various other detalis of mpprove
Thill Covpling.-James T. Hards, of Geneva, ill.-This invention furnishes an improved thill coupling which mag be coupled and uncoapled
without trouble. The cllp and yoke of the coupling are constructed and attached to the axle in the ordinary manner. Upon the forward arm of the clilp, above the end of the yoke, is formed a chamber having a rectangular
hole formed through it 0 serve as a socket for the head of the thill 1 ron hole formed through it to serve as a socket for the head of the thill Iron.
The front bar of the chamber is concaved upon its inner surface. The head
 and support the draft trrain. The head of the thill iron is slotted trans Versely $u$ pon 1 its rear side to receive a pin which pases through the stde
bars of the socket, and 1 siveted or otherwise secured to bars of the socket, and 1 i riveted or otherwise secured to it. The pln serves
as a hinge to the thilliron, and also to support the strain in holding back. By this construction the thillirons can be readily raised from the socket, tion in which they can possilly be while attached to a horse.
Mrrir Box.-Andrew Clayton Hall, of Carbondale, Pa.-This invention relatest oa new form of saw guldes, and to anew com bination of the same
with the posts and swivel bar of a mitter box, which greatily tmproves the general arrangement of the parts. It consists, fritt, in making the guldes laterally adjustabe on vertical slildes, so that they can be fitted to any
tuickerness of saw blades ; and, second, in comblining said guides and slidees
 bar to which the other is secured.
SAD Iroos STAND.-George O. Ballou, of Fall River, Mass.-TMis Invention consits of a a sad Iron stand made of metal or other suitable substance, the
top of whicc is is recessed so as to form a receptacle for an appropriate pol1sising composition; thereby forming a convenient and serviceabbe article the laundress.
 This invention relates to improvements in machines for crozing, chamfer consists in a hollow shaft which carries a radially grooved disks, in the grooves of which the sliding tool stocks are mounted, and a second shaft
which works within the frrt and carries a cam arrangement for giving rad Which works within the frrst and carries a cam arrangement for giving rad.
1al motion to the tool stocks. The
atter 19 the hollow shaft by $a$ wheel having a different number of teeth, so that the and the second moves them to or away tom thelr work,so that they may be
 with a sliding table which carries the tools, and a ring in which the barrel is
held. Stram Bilirr.-James N. Paxman and Henry M. Davy, of Colchester England. -In this invention an annular vertical botler surround its fre
box and vertlcal flue; and bent water tubes are placed in the fre box which connect at their lower ends with the sides of the annulus and et upper with the crown sheet. The improvement in these tubees condists is in
making them taper or contracted at their lower bent ends, where the cold. making them taper or contracted at their lower bent ends, where the cold-
er water enters, so as to impart a scouring action to the current and pre Vent Incrustatiton. They mana aliso be provided with ribbed plugs so as to in their upper ends to direct the materer laterally and downward, and varione other improvements are made in the boller generally.
 spring curtain fixtures, and it conists in attaching to one end of the roller such form as to fall against and engage with recesses 1 t the roller by their own gravitr. When quilek motion is given to the roller elther In letting ap or pulling down the ourtain, centrifagal force throws the pawls outward from the splndile, but apon slackening the motion one or
the other of them drops and stops the curtaln.
 George Holt Mason, of same place.-This invention relates to an improved
means of mounting and securing stereotype and other plates in a printin
press, whereby a reat taving of time and labor 1 is entectect, thasm ach as the the use of the ordinary chases, leads, and other piecees, technically calle farniture, 1s dispensed with. It consists in providing the bed with paralle
olique bars mhich are of $T$ form in cross section, and to which are at oblique bars $\$$ which are of $T$ form in cross section, and to wh.
tached the plates by serew cllps and nuts, or their equivalents.
SoLDRrisa Rod.- Willam M. Neill, of Briageport, Conn., assignor to Iddering thi rooft miore eapecially, but is adapted to other purposes. Tin roofs are generally soldered with resin and solder separate, and the resin requently becomes displaced by jaring, or is blown away by the wind These diffcultites are overcome by making a tube of the solder and flling the same with resin, or by combining the resin with a rod of soider, in suc
a manner that both are applied at one time and in proper proportions. CEATR.-Randolphs; Mains, of New York city. -This invention consist
 eplained verbally. Lt admits of being made to assume seventeen or more the simple chair, it can be converted into several forms of easy and Invalid nairs and oofas, and parts of the apparatus are so contrived as to act
Trimi Covpuixa.--John H. Morgan, of Lebanon, Ing, - This invention o constructed that, while coupling the thills or tongue securely, it may b easily and quickly uncoupled. A yoke, the forward end of which consist of two projecting lagg, 1 f fastened by clipg to the axle. The lags have in cined glots formed in them, extending downward and forward from theit pper eages. to fecive as of the thilitiron. The forward parts of the thill Iron are secured do the erear end of the thill, and the rear parts are branched
ret to recelve the lugs between them. By this construction the boit can be
readily passed into and out of the tnclined slots in the lugg. The fastening readily passedinto and out of the Inclined slots in the lugs. The fastening
or unfastening is s ffected by means of a hook which 1 s plvoted between the

Dovarsur Cortrr.-John F. Blondel, of Thomaston, Me.-This inven be automatically; it consists in the combination of a spring and tollower With the center tube in such a manner that the spring is compressed whe he dough is cut, and the dough in the tube pushed out by the recoll of the
 To provide tmproved means for redncing wood to pulp tor the manufacture of paper; and it consists more particiarisly of a revolving grinding emer Wheel which is hung on a horizontal shatt and surrounded by a curb o casing. The casing 19 provided with apertures on each side of the grinding heee to admul hee woaden blocks which are to be reducea, and which are $\underset{\substack{\text { autom. } \\ \text { sm. }}}{\substack{\text { In }}}$
Ironimg Board.-Leander N. Vallett, of Providence, r. I.-This inven an reates to a new device for fastening ironing boards to walns or uprig It consists in a new form of sockets on the end of the board, and in thei Combination with hooks on the wall ror entering the bockets; and aliso in
ovel arrangement of ears under the board for recelving the projectin ovel arrangement of earb
Harvistre Dropprr.-Richard A. Roberts, of Salisbury, Mo.-This inn construction, light, and not liable to get oat of order; it drops the grain ngavele at the side of the machine, 80 as to be entirely out or the was
vhen making the next round.
Bixin
Bindur Bri.-James Burns, of East Topham, Vt.-The object of this in
eextion is to provide means for rendering the common bridle bit effective vention 18 to provide means for rendering the common briale bit effectiv
or controlling restive, vicious, and runaway horsees, and it consists in at for controlling restlve, vicious, and runaway horses, and it conilits in at-
taching to one, or both of the parts of the bit one or more lugs or staples, which bear agansint the roots of the tongue or other sensitive part of the mouth when the reling are drawn.
Crask MAOHINE.-Webster H. Pease, of Falton, Wis,-This invention re
ates to a new machine which prepares the tobacco to be used a a a fller igars by rolling it into emape and binding and euttung it with great rapic ty. It consistst in a new arrangement with rotary knives for catting the Mier leaves into strips; of groved roilers for collecting them Into cylip
drical form, and of a winding wheel for tyling the tller with string or apply ng a wrapper. It also consists in the combination, with the foregolng, an endless apron on which the filler leaves arefed along in the desired manner, and in the arrangement of ro
clgars or 1 lleers in proper lengths.
 escribs the mantres sain - Milis invention was alluded to in our artic Vol. XXVI. It is an apparatus for $\ln$ nishing the matresess after it leaves the stuffer, and consists in a almple arrangement of a slotted siluiling table (on
which the mattress is lid 1 and
 ear their points, and upon and by their withdrawal the tacking and stufte ing 18 accomplished.
Rantwix Car Truok.-Jose S. Camacho, of Habana, Cuba.-This inven cars while running on curves, and consists in the arrangement of a swive rame holding two parrs of wheels in such a manner that each wheel cail
Traction Engering. - Louls A. Herrmann, of Paris, France.-The princi pal feature in this invention consists it propelling the encxine by four leg and feet, whal are made to move, two and two, in the manner of a four
footed annmal, They are worked by steana power, and are compelled to sustain the weight of the engine in making the steps so as to cause the
necessary adhesion of the foot to the ground. The invention prehensive and includes all the parta necessary to a highly eftcicient and anageable traction engine,
Hat SEADz.-Marcas L. Battle, of Bainbridge, Georgia.-This Invention relates to an Improvement in shdes designed to form extensions of the
orim of a hat. The shade is made of linen, or any other suitable materian orim ti at. The shade is made of linen, or any other suitable material smade dooble, the upper part having a central aperture to recelve the crown of the hat, and the lower part being made with a somemhat larger
pening. An elastic cord 18 secured to each part around to thner nd thus the tensionof these, as opposed to the hoop, keeps the shade disended so as to be fat and smooth. The cord in the upper part se
oo keep the shade in position by embracing the crown of the hat.
 port of tables, chairs, etc. The leg is made of several layers of vene Sued together, and is bent to the requiste form and carved or ornamented In a suitable manner. Thus made, the legs are very strong and durable, the Spranina Tubs Ansunolator.-Robert May, New York city.-This invention relates to an Improved mechanism, which, when connected with ant and show at which tube response is required. 1 lt consisist in combining adrop ball or swinging plate, which is set in motion by alr blown through he speaking tube, with a balanced lever, which latter serves to establibh Fhen moved by the displacement of said ball or plate, an electric circuit
by means of which the annunciator 1 sactuated Prus Rewxyr. -LIzzie E. Brady, Gatesrille, N. C., assignor to herselt, medical compound for the cure of the disease named composed or and fourth of an ounce of tincture of opplum to throe fourtho of an ounce of water
and half an ounce of pare eume arable.

## Practical Iints to Inrentors.

M ONN \& CO., Publishers of the Scientipic Amprican atent in this and foreign countries. More than 50,000 inventors have avail d themselvee of theirl services in procuring patents, and many millilonso iollars have accrued to the patentees whose especitications and claims they
ouve preparec. No discrimnation against foreligners; subjects of all coun ave prepared. No discrimination against foreigners; subjects of all coun

## How Can I Obtain a Patent 9

is the closing inquiry in neariy every letter, desecribng some invention Which coties to this offlice. $\Delta$ positive answer can only be had by presenting complete application for a patent to the Commissioner of Patents. A Ion. Various offlcial rules and formalities must also be observed. The arcess, After great perplexity and delay, he is susually glad to seek the of persons experienced in patent businines, and have all the work done ove gain. The best plan is to solicit proper advice at the beginning. It the parties consulted are honorable men, the inventor may sately confide his deas to them: they will advise whether the improvement is probably pat

## How dan I Beat secure My Invention 3

This is an inquiry which one inventor naturally asks another, who has had some expert
Construct a neatmodel, not over a foot in any dimension-smaller if pos-Ible-and send by express, prepaid, addressed to Mons \& Co., 37 Park Row ew York, together with a description of its operation and merits. On re its patentability, free of charge. Or, if you have not time, or the means a hand,to construct
provement as possi - model, make as good a pen and ink skend by mail. An answer as to the prospect of a patent will be recelved, usually by return of mail. It is sometimes best to ave a search made at the Patent Offlee; such a messure often saves the cos

## Preliminary Examination.

In order to have such search, make out a writen description of the inven on, in your own words, and a pencil, or pen and ink, sketch. Send thes tht the fee or 85 , by mall, addressed to MON \& Co., st Park Row, and en report in regard to the patentability of your improvement. This specia earch is made with great care, among the models and patents at Washing

## To Make an Application for a Patent

The applicant for a patent should farnish a model of his invention, it su rention be and ars of which his composition consists. These should be securely packed, the inventor's name marked on them, and sent by express, prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by a dratr, or postal order, on New Yors, payable to tre can
der ot MNN \& Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York oorres-

## Caveats.

Persons desiring to fle a caveat can have the papers prepared in the short-
st time, by sending a sketch and description of the invention. The Govern nent fee for a caveat is $\$ 10$. A pamphlet of advice regarding apphcation or patents and caveats is furnished gratis, on apphication by mail. Addre

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relievo, or bas relief; any new and original design for the printing of woolen, silk, cotton, or other fabrics; any new and original impression, ornaplaced on or worked into any article of manufacture
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EXTENSIONS GRANTED.
20,960.-Boot Herl Shaver.-V. Snell.
20,970. - Electromagnetic Alakm.-W.
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